[redacted]

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA, *et al.*, Plaintiffs, v. GOOGLE LLC, Defendant.	Case No. 1:20-cv-03010-APM HON. AMIT P. MEHTA [redacted]
STATE OF COLORADO, *et al.* Plaintiffs, v. GOOGLE LLC, Defendant.	Case No. 1:20-cv-03715-APM HON. AMIT P. MEHTA [redacted]

PLAINTIFFS' PROPOSED FINDINGS OF FACT

February 9, 2024 [Corrected April 30, 2024]

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Abbreviations

API	Application Programming Interface
CPC	Cost Per Click
CPM	Cost Per Mille (thousand impressions)
CTR	Click-Through Rate
DHP	Default Home Page
DSE	Default Search Engine
EU	European Union
GMS	Google Mobile Services
GPS	Google Play Services
GSA	Google Search App
GSE	General Search Engine
GTM	Go To Market
IS	Information Satisfaction
ISA	Information Services Agreement (for Apple)
JCA	Joint Cooperation Agreement (for Apple)
LTV	Long-Term Value
MADA	Mobile Application Distribution Agreement (for Android)
MIA	Mobile Incentive Agreement (for Android)
ML	Machine Learning
MSIA	Mobile Service Incentive Agreement (for Android)
OEM	Original Equipment Manufacturer
OKR	Objectives And Key Results
OS	Operating System
pCQ	Predicted Creative Quality
pCTR	Predicted Click-Through Rate
PLA	Product Listing Ad
pLQ	Predicted Landing Page Quality
rGSP	Randomized Generalized Second Price
ROAS	Return On Ad Spend
ROI	Return On Investment
RPM	Revenue Per Mille (thousand queries)
RSA	Revenue Share Agreement (for Android)
SERP	Search Engine Result Page
SQR	Search Query Report
SVP	Specialized Vertical Provider
TAC	Traffic Acquisition Cost

[redacted]

Citations to Witness Testimony

Trial Transcript:

Tr. [PP:LL]–[PP:LL] **(**[*witness last name*] **(**[*affiliation*]**))**
e.g., Tr. 2204:4–2205:21 (Giannandrea (Apple)); Tr. 4610:12–22 (Whinston (Pls. Expert))

Designated Testimony:

Des. Tr. [PP:LL]–[PP:LL] **(**[deponent last name] **(**[affiliation]**) Dep.)**
e.g., Des. Tr. 21:18–22:1, 41:23–42:10 (James (Amazon) Dep.); Des. Tr. 82:7–22, 83:13–24 (Apple-EC 30(b)(6) Dep.)

Live Witnesses	Appearance in Citations
Austin, Alex, Branch Metrics	**(Austin (Branch))**
Alberts, Brendan, Dentsu	**(Alberts (Dentsu) Dep.)**
Apple 30(b)(6): Cue, Eduardo (30(b)(6))	 **(Apple-EC 30(b)(6) Dep.)**
Baker, W. Mitchell, Mozilla	**(Baker (Mozilla) Dep.)**
Barton, Christopher, *former* Google	**(Barton (Google))**
Baxter, Timothy, Samsung	**(Baxter (Samsung) Dep.)**
Booth, Ryan, The Home Depot	**(Booth (The Home Depot))**
Braddi, Joan, Google	**(Braddi (Google))**
Chang, Patrick, Samsung Next	**(Chang (Samsung Next))**
Christensen, Eric, Motorola	**(Christensen (Motorola) Dep.)**
Chu, Penny, Google	**(Chu (Google) Dep.)**
Connell, Derrick, *former* Microsoft	**(Connell (Microsoft) Dep.)**
Cue, Eduardo, Apple	**(Cue (Apple))**
Dacey, Matthew, TripAdvisor	**(Dacey (TripAdvisor) Dep.)**
Daniels, Alexander, Thumbtack	**(Daniels (Thumbtack) Dep.)**
Dijk, Arjan, Booking.com	**(Dijk (Booking.com))**
Dischler, Jerry, Google	**(Dischler (Google))**
Edwards, Catherine, Google	**(Edwards (Google) Dep.)**
Ezell, Jeffrey, AT&T	**(Ezell (AT&T) Dep.)**
Fitzpatrick, Jennifer, Google	**(Fitzpatrick (Google))**
Fox, Edward, Defendant's Expert	**(Fox (Def. Expert))**
Fox, Nicholas, Google	**(Fox (Google) Dep.)**
Giannandrea, John, Apple & *former* Google	**(Giannandrea (Apple))**
Giard, Jeffrey, T-Mobile	**(Giard (T-Mobile) Dep.)**
Gomes, Benedict, Google	**(Gomes (Google))**
Google 30(b)(6): Fox, Nicholas (30(b)(6)) Grey, Rachel (30(b)(6) (Sept. 24, 2021)) Grey, Rachel (30(b)(6) (May 5, 2022)) Nayak, P. Pandurang (30(b)(6))	 **(Google-NF 30(b)(6) Dep.)** **(Google-RG1 30(b)(6) Dep.)** **(Google-RG2 30(b)(6) Dep.)** **(Google-PN 30(b)(6) Dep.)**

[redacted]

Live Witnesses	Appearance in Citations
Higgins, Brian, Verizon	**(Higgins (Verizon))**
Holden, Richard, Google	**(Holden (Google))**
Hurst, Jeff, Expedia Group	**(Hurst (Expedia))**
Israel, Mark, Defendant's Expert	**(Israel (Def. Expert))**
Jain, Sundeep, *former* Google	**(Jain (Google) Dep.)**
James, Mike, Amazon.com	**(James (Amazon) Dep.)**
Jerath, Kinshuk, Plaintiffs' Expert	**(Jerath (Pls. Expert))**
Juda, Adam, Google	**(Juda (Google))**
Kartasheva, Anna, Google	**(Kartasheva (Google))**
Kolotouros, James, Google	**(Kolotouros (Google))**
Krueger, Ryan, Google	**(R. Krueger (Google))**
Lehman, Eric, *former* Google	**(Lehman (Google))**
Levine, Zahava, *former* Google	**(Levine (Google) Dep.)**
Levy, Daniel, Meta (Facebook)	**(Levy (Meta) Dep.)**
Lim, Tracy-Ann, JPMorgan Chase	**(Lim (JPMorgan))**
Lowcock, Joshua, Interpublic Group	**(Lowcock (IPG))**
McAteer, John, Google	**(McAteer (Google) Dep.)**
McCallister, Adrienne, Google	**(McCallister (Google))**
Miller, Andrew, Google	**(Miller (Google) Dep.)**
Moxley, Emily, Google	**(Moxley (Google) Dep.)**
Murphy, Kevin, Defendant's Expert	**(Murphy (Def. Expert))**
Nadella, Satya, Microsoft	**(Nadella (Microsoft))**
Nayak, P. Pandurang, Google	**(Nayak (Google))**
Neil Barrett-Bowen, Microsoft	**(Barrett-Bowen (Microsoft))**
Oard, Doug, Plaintiffs' Expert	**(Oard (Pls. Expert))**
Parakhin, Mikhail, Microsoft	**(Parakhin (Microsoft))**
Perica, Adrian, Apple	**(Perica (Apple) Dep.)**
Pichai, Sundar, Google	**(Pichai (Google))**
Porat, Ruth, Google	**(Porat (Google) Dep.)**
Raghavan, Prabhakar, Google	**(Raghavan (Google))**
Ramalingam, Ramesh, *former* Yahoo	**(Ramalingam (Yahoo) Dep.)**
Ramaswamy, Sridhar, Neeva & *former* Google	**(Ramaswamy (Neeva))**
Rangel, Antonio, Plaintiffs' Expert	**(Rangel (Pls. Expert))**
Raymond, Christie, Kohl's	**(Raymond (Kohl's) Dep.)**
Reid (Hamon Reid), Elizabeth, Google	**(Reid (Google))**
Ribas, Jordi, Microsoft	**(Ribas (Microsoft) Dep.)**
Rosenberg, Jamie, Google	**(Rosenberg (Google))**
Roszak, Michael, Google	**(Roszak (Google))**
Silverman, Andrew, Google	**(Silverman (Google) Dep.)**
Soo, Debby, Booking (OpenTable)	**(Soo (OpenTable) Dep.)**

[redacted]

Live Witnesses	**Appearance in Citations**
Stein, Mark, IAC (ANGI)	**(Stein (IAC) Dep.)**
Tinter, Jon, Microsoft	**(Tinter (Microsoft))**
Utter, Brian, Microsoft	**(Utter (Microsoft) Dep.)**
Vallez, Paul, Skai	**(Vallez (Skai))**
van der Kooi, Rik, *former* Microsoft	**(van der Kooi (Microsoft) Dep.)**
Varia, Amit, Google	**(Varia (Google))**
Varian, Hal, Google	**(Varian (Google))**
Weinberg, Gabriel, DuckDuckGo	**(Weinberg (DuckDuckGo))**
Whinston, Michael, Plaintiffs' Expert	**(Whinston (Pls. Expert))**

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I. INTRODUCTION TO THE PARTIES

A. The Plaintiffs

1. The United States of America, acting at the direction of the Attorney General of the United States, and the States of Arkansas, California, Florida, Georgia, Indiana, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Montana, South Carolina, Texas, and Wisconsin (Plaintiffs) brought this action under Section 2 of the Sherman Act, 15 U.S.C. § 2, to restrain Google LLC from unlawfully maintaining monopolies in the markets for general search services, search advertising (Search Ads), and general search text advertising (Text Ads) in the United States through anticompetitive and exclusionary practices, and to remedy the effects of this conduct. Plaintiffs' Amended Complaint, ECF. No. 94, at 2–3.

2. In addition, 38 other States and jurisdictions (the "Plaintiff States") filed a separate action that incorporates the allegations in the DOJ Amended Complaint, while presenting additional factual allegations of unlawful monopoly maintenance by Google in the relevant markets. Case No. 20-cv-03715, ECF No. 1. The Plaintiff States are: Colorado, Nebraska, Arizona, Iowa, New York, North Carolina, Tennessee, Utah, Alaska, Connecticut, Delaware, District of Columbia, Guam, Hawaii, Idaho, Illinois, Kansas, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Puerto Rico, Rhode Island, South Dakota, Vermont, Virginia, Washington, West Virginia, and Wyoming.

B. The Defendant

3. Google is one of the largest internet-services companies worldwide and in the United States. Headquartered in Mountain View, California, and founded more than two decades ago, Google is today the largest business segment of Alphabet, Inc. UPX8085 at -851. The products at issue in this case—ads, Android, Chrome, and the near ubiquitous Google search

[redacted]

service—are among Google's core products and services. UPX8085 at -852. Every day, billions of searches are sent to Google from throughout the world, which adds up to "trillions of searches on Google every year." UPX8085 at -851; UPX0001 at -531 (Google receives more than 3 billion searches each day). When the complaint in this action was filed in October 2020, Google had a roughly $1 trillion market capitalization, with revenue exceeding $160 billion in 2019. Google's Answer, ECF No. 103, at 2. By 2022, Google's market capitalization had swelled to $1.26 trillion with revenue exceeding $282 billion. UPX8085 at -848, -879.

II. INTRODUCTION TO THIRD PARTIES

A. Amazon

4. Amazon is a technology company with a focus on e-commerce and headquartered in Seattle, Washington. DX1035 at -512–13. Amazon purchases both Text Ads and shopping ads from Google and Bing. Des. Tr. 21:18–22:1, 41:23–42:10 (James (Amazon) Dep.). Amazon is one of the largest purchasers of Search Ads from Google, spending more than $[redacted] billion on Google Search Ads in 2021. Des. Tr. 27:4–10 (James (Amazon) Dep.). Search Ads are an important source of revenue and customer acquisition for Amazon. Des. Tr. 24:4–10 (James (Amazon) Dep.).

5. Although primarily a retailer, Amazon also offers advertising products. Amazon-sponsored product ads appear in response to consumers' real-time queries on amazon.com. Tr. 5379:21–5380:5, 5380:9–14, 5437:17–5438:4 (Jerath (Pls. Expert)) ("When you think of Amazon, shopping ads are sponsored product ads," and discussing UPXD103 at 4–5); Des. Tr. 141:4–7 (Jain (Google) Dep.) (Searches that give rise to PLAs are comparable to Amazon ads.). The vast majority, if not all, of Amazon's product ads link only Amazon's internal sites (i.e., product or merchant Amazon pages) and can be purchased only by businesses selling products on Amazon. Des. Tr. 105:4–105:8, 105:15–23 (James (Amazon) Dep.); Tr. 3857:24–

[redacted]

3858:10 (Lowcock (IPG)). Thus, Amazon, like many other specialized search engines, seeks to keep users on the search engine's platform or website. Tr. 1492:11–25 (Dischler (Google)); Tr. 3852:25–3853:11, 3857:18–3558:18 ((Lowcock (IPG)) (search results on retailer websites (e.g., Amazon, Walmart) keep the user on retailer's site); Des. Tr. 27:25–28:1, 28:3–28:10 (Ramalingam (Yahoo) Dep.) (A "general search engine would provide answers without any specific restriction to a domain" and a "vertical one is going to be either focused on a particular domain or particular aspect of vertical").

B. Apple

6. Apple Inc. is a technology company headquartered in Cupertino, California. UPX8105 at -172. Apple manufactures iPhone smartphones that run on Apple's iOS operating system, iPad tablets that run on Apple's iPadOS operating system, and personal computers, called Macs, that run on Apple's MacOS operating system.[1] UPX8105 at -175; UPX5141 at -552 (defining smartphone as "any mobile wireless device running the Android or iOS operating system"). In 2022, Apple reported $394 billion in total net sales and $119 billion in operating income. UPX8105 at -203.

7. Apple offers a web browser known as Safari. Apple preinstalls Safari on Apple's mobile devices and personal computers. Tr. 2454:11–16 (Cue (Apple)). Since 2002, Apple has only offered one web browser: Safari. Des. Tr. 20:14–16 (Apple-EC 30(b)(6) Dep.).

8. On its devices, Apple also offers a "universal search" feature, known as Spotlight. Spotlight is primarily used to search for on-device content but it can also be used to search for

[1] Because iPads previously ran on Apple's iOS operating system, iPhones and iPads are sometimes referred to collectively as "iOS devices."

[redacted]

information on the web. Tr. 2204:4–2205:21 (Giannandrea (Apple)) (referring to UPXD006 at 1–2); Tr. 2496:17–22 (Cue (Apple)); Des. Tr. 39:21–40:19 (Edwards (Google) Dep.) (In addition to searching on-device content and apps, Spotlight has "query suggestions that you could click on that would then open a web browser with a search query in it."). Spotlight does not provide a general search service. Tr. 2205:16–21 (Giannandrea (Apple)). Apple does not show ads in Spotlight. Tr. 2496:23–24 (Cue (Apple)).

9. Siri is Apple's voice assistant. Siri is primarily focused on (1) helping users perform actions and (2) providing answers to questions. Tr. 2236:13–2237:10 (Giannandrea (Apple)); Tr. 2496:11–14 (Cue (Apple)) ("It's an . . . audio assistant . . . . It tries to help you get things done."). If a user asks Siri to "search the web," Siri can provide results using web search. Tr. 2236:13–2237:10 (Giannandrea (Apple)) ("[I]f you . . . say 'Siri' or you press the button on the side of the phone and ask a question or do an action like send a text message, [] we try to do that for you."); *id.* 2237:12–2238:1 ("The Siri voice assistant has a feature which is: Search the web for this. So you might say show me pictures of puppies or search the web for . . . USBs. And so for that feature inside of Siri, it can fall back to web search."). Siri's goal is to answer as much as possible of what customers ask with a "fallback" to web search if Apple does not know the answer. Tr. 2535:6–2537:6 (Cue (Apple)). Siri does not provide a general search service. Tr. 2237:20–23 (Giannandrea (Apple)). Apple does not show ads in Siri. Tr. 2496:15–16 (Cue (Apple)).

10. Apple offers users information and recommendations, known as Suggestions, as the users enter text into Safari's URL bar. Tr. 2208:22–2209:4 (Giannandrea (Apple)). With this feature, Apple infers what the user is looking for and provides a path to the right answer. *Id.* 2216:25–2218:5 (explaining UPXD007, which depicts a Suggestion in Safari). In some

[redacted]

Suggestions, Apple provides its own answers directly to the user, and in others, Apple provides links to third-party websites. *Id.* 2234:1–2235:4.

11. Apple is Google's largest distribution partner. Google has had a search distribution agreement with Apple since 2002; since 2005, this agreement has required Apple to pre-set Google as Safari's exclusive default general search service. *Infra* ¶¶ 209–230 (§ III.F.1). In search, Google and Apple seek to "work as if [they] are one company." UPX0617 at -059; *id.* at -058 (Dec. 20, 2018 email from Donald Harrison (Google) recounting that Tim Cook's "overall message to Google was 'I imagine us as being able to be deep deep partners; deeply connected where [Apple's] services end and [Google's] begin'").

12. Under the Apple distribution agreement, Google has made enormous payments to Apple. In 2022, Google's overall, worldwide payment to Apple under the distribution agreement exceeded $20 billion. *Infra* ¶ 935. Google's payments to Apple for Safari address-bar queries alone exceeded $9.6 billion in fiscal year 2020 and surpassed a billion dollars every month by May 2021.[2] *Infra* ¶ 935.

13. Also, Apple is Android's largest competitor in the sale of mobile devices in the United States. Tr. 7653:12–14 (Pichai (Google)); *id.* 7711:3–16 ("We continued to have moments of tension between the two companies. So it's tough for me -- we build Android, they build iPhones. We compete every day in the marketplace on that and many, many other products."); *id.* 7804:19–21.

[2] By comparison, Google collectively paid carriers and Android OEMs more than $1.5 billion for U.S. searches in 2020. *Infra* ¶ 936.

[redacted]

C. AT&T

14. AT&T Mobility LLC, headquartered in Atlanta, Georgia, has sold Android devices since 2011. JX0091 at -742. Approximately [redacted]% of AT&T's smartphone sales are Android devices, Des. Tr. 29:11–25 (Ezell (AT&T) Dep.), and with only brief exceptions in 2013 and 2014, each of those devices come preloaded with Google apps and services, *id.* 73:17–74:24, 87:11–20, 87:23–90:1, 293:18–294:10.

15. Google and AT&T have been party to an RSA continuously since 2011 and have periodically updated and extended the agreement over the last two decades. *Infra* ¶¶ 272–275 (§ III.F.2.b.i.a).

D. Booking.com

16. Booking.com is an online travel agency headquartered in Amsterdam, Netherlands. DX3114 at .003–05, .035. Booking is an e-commerce platform where consumers can go to book hotels, flights, cars, and attractions. Tr. 5230:20–5231:7 (Dijk (Booking)). Booking is thus a specialized vertical provider and not a general search engine. *Id.* 5230:20–23. Booking buys Search Ads primarily on Google and to a much smaller extent on Bing. *Id.* 5231:8–20. Booking purchases Search Ads to get to "high-intent customers" who "have expressed a very clear interest in booking a hotel." *Id.* 5236:18–5237:1. Booking does not sell text ads but does sell other ads on its website. *Id.* 5244:10–5245:1.

17. OpenTable is one Booking brand. Des. Tr. 17:22–18:4 (Soo (OpenTable) Dep.). OpenTable is a site for booking online restaurant reservations, providing services to both consumers and restaurants. *Id.* 40:19–41:5. OpenTable purchases Search Ads on Google and Bing. *Id.* 220:21–221:6.

[redacted]

E. Branch

18. Branch Metrics (Branch) is a software company that develops tools for navigating and discovering mobile applications. Over 100,000 apps use Branch's deep linking technology to route users to specific content pages within the apps. Tr. 2906:3–2907:3 (Austin (Branch)) (describing how Branch has developed and marketed tools, other than an app-search tool, that help users interact with their apps).

19. Branch's primary mission since 2014 has been building a service that allows consumers to search for mobile app pages as easily as they search for webpages. Branch's app-search tool (1) allows users to enter a query, (2) displays search results that list mobile app content responding to that query, and (3) sends users directly to that content when they click on search results. *Id.* 2893:18–2895:6 (describing the company's mission and explaining design of Branch's app-search tool).

F. Brave

20. Brave Software, Inc. (Brave) is headquartered in San Francisco, California. Brave develops the Brave browser and the Brave search engine. UPX0829 at -187, -190; Tr. 9693:8–9695:3 (Murphy (Def. Expert)). Brave's browser distributes the Brave search engine. Tr. 9693:8–9695:3 (Murphy (Def. Expert)).

G. Dentsu

21. Dentsu is an advertising company headquartered in Tokyo, Japan. UPX0772 at -783; Des. Tr. 22:14–25:8 (Alberts (Dentsu) Dep.). Dentsu has separate teams for ads appearing on general search engines and ads not placed with general search engines. *Id.* 40:23–42:15. Dentsu purchases Text Ads on behalf of its clients; most of these are placed on Google. *Id.* 24:9–16.

[redacted]

H. DuckDuckGo

22. DuckDuckGo is a general search services provider based in Paoli, Pennsylvania. Founded in 2008, DuckDuckGo offers a number of privacy-focused web services, including a browser and email service, but is best known for its private search engine. Tr. 1937:8–20 (Weinberg (DuckDuckGo)). DuckDuckGo licenses search results from Microsoft, including ads, but also indexes the parts of the web for proprietary modules displayed alongside "the traditional links." *Id.* 1938:16–1939:23. DuckDuckGo responds to approximately 100 million searches a day. *Id.* 1938:11–15.

23. DuckDuckGo has a general search services market share of 0.88% in the United States as of 2020. PSX00338 at -828.

I. Expedia

24. Expedia Group (Expedia) is an online travel agency headquartered in Seattle, Washington. DX0308 at .001, .004. Expedia sells flights, hotel rentals, vacation rentals, car rentals, and other parts of a trip experience. Tr. 6500:15–18 (Hurst (Expedia)). Expedia is thus a SVP and not a general search engine. *Id.* 6580:4–15. Expedia includes three primary brands: expedia.com, hotels.com, and Vrbo. *Id.* 6500:15–25. The largest source of spend at Expedia is paid Search Ads. *Id.* 6506:18–21. Expedia's advertising spend on Google is ten times bigger than Expedia's spend on Bing. *Id.* 6506:3–14. Expedia also sells Search Ads on its websites. Tr. 5380:9–14 (Jerath (Pls. Expert)) (discussing UPXD103 at 5).

J. Facebook

25. Facebook is a social media service owned by Meta and headquartered in Menlo Park, California. DX0589 at .001, .011. Facebook generates most of its revenue from advertising. *Id.* at .026. Many of the companies that purchase ads from Facebook "spend only a relatively small portion of their advertising budget" on Facebook ads. *Id.* Nearly all the ads shown on

[redacted]

Facebook are social ads; only [redacted]% are Search Ads. UPX1019 at -524; UPX2113 at -789. Apple's recent privacy initiatives have substantially undermined Facebook's ability to sell targeted or retargeted ads. UPX0923 at -695 ("For Safari users: . . . Targeting crippled, retargeting impossible."); Des. Tr. 164:13–165:6, 172:15–24 (Levy (Meta) Dep.) (as a result of Apple's privacy initiatives, Meta's "ability to help advertisers target their ads has been impacted negatively;" Apple's iOS 14 privacy changes made "it much harder or potentially not even possible" for Meta to effectively retarget ads)). *Infra* ¶ 422.

K. IPG

26. IPG is a holding company for mobile advertising and media agencies. Tr. 3801:19–3802:4 (Lowcock (IPG)). IPG entity Universal McCann is a media agency that purchases and places advertisements on behalf of its clients. *Id.* Reprise, an IPG agency, specializes in advising clients on purchasing search and social ads. *Id.* 3878:19–3879:1. IPG recommends that clients purchase Google Search Ads, even in the face of price increases. *Id.* 3826:4–15, 3827:20–23.

L. JPMorgan Chase

27. JPMorgan Chase & Co. (JPMorgan) is a financial services company headquartered in New York, New York. JPMorgan buys Text Ads from Google and Bing, splitting its spend between the two roughly 90% and 10% respectively. Tr. 4869:7–23 (Lim (JPMorgan)); DX0663 at -491. All JPMorgan's business lines purchase Search Ads, whereas only some of its business lines purchase other ad types. Tr. 4842:15–4843:2 (Lim (JPMorgan)). JPMorgan spends three times more on Search Ads than it spends on social ads. *Id.* 4861:23–25.

[redacted]

M. LG Electronics

28. LG Electronics (LG), based in Seoul, South Korea, was a leading manufacturer of Android devices sold in the United States. UPX0558 at -051–52; UPX5358 at -001; Tr. 1516:4–21 (Yoo (Google)). In 2021, LG stopped selling smartphones in the United States. Tr. 820:3–5 (Kolotouros (Google)).

29. Google and LG have been party to Mobile Application Distribution Agreements (MADAs) and Revenue Sharing Agreements (RSAs) continuously since 2007 and 2009, respectively, and have periodically updated and extended the agreements over the last two decades. *Infra* ¶¶ 237, 254.

N. Microsoft

30. Microsoft Corp. is a technology company headquartered in Redmond, Washington. UPX8094 at -517, -519. Microsoft sells Search Ads and display ads globally. *Id.* at -531.

31. Microsoft licensed a third-party general search engine (MSN Search) in 1998, began offering its own general search engine in 2005, and launched the Bing branding in 2009. Tr. 3546:13–3548:5 (Nadella (Microsoft)). In 2009, Yahoo began syndicating its organic search results from Microsoft. *Id.* 3641:2–3642:24; DX0271 at .002. Today, Microsoft is Google's only general search engine competitor in the United States that crawls the internet to create its own web index. *Infra* ¶ 75. Microsoft has invested approximately $100 billion in Bing over the past 20 years and has a current market share of 5.5% in the United States as of 2020. *Infra* ¶¶ 522, 538.

32. Microsoft owns and operates the Windows Operating System for desktop computers. Microsoft has preloaded the Internet Explorer or Edge browser on computers with Windows for many years. Tr. 3580:2–12 (Nadella (Microsoft)). Bing and its predecessors have

[redacted]

been the default search engine on Microsoft's browsers since 2005. Tr. 7677:5–23 (Pichai (Google)); UPX0172 at -730–31.

O. Motorola

33. Motorola Mobility LLM, headquartered in Chicago, Illinois, is a leading manufacturer of Android devices sold in the United States. JX0039 at -794 (Motorola RSA (2017)); Tr. 1103:13–23 (Higgins (Verizon)). Motorola has manufactured Android smartphones since 2009, and exclusively used Android as the mobile operating system for its smartphones since 2012. Des. Tr. 21:17–23:1 (Christensen (Motorola) Dep.).

34. Google acquired Motorola in 2012. *Id.* 142:11–19. Google later sold Motorola to Lenovo Group Ltd., and Motorola is now a subsidiary of Lenovo. *Id.* 15:12–17. Google and Motorola have been party to a MADA and RSA continuously since 2009 and 2005, respectively, and have periodically updated and extended the agreements over the last two decades. *Infra* ¶¶ 237, 254. Since Lenovo's purchase of Motorola, Motorola-branded devices have been subject to Lenovo's MADA and RSA. *Id.* 63:23–64:23.

P. Mozilla

35. Maker of the Firefox browser, Mozilla is a software company headquartered in Mountain View, California. JX0031 at -612 (Mozilla SA (2016)). Firefox has around 10% share of the browser market on desktop and a "[v]ery, very small" share among browsers on mobile. Des. Tr. 127:12–128:8, 134:9–23 (Baker (Mozilla) Dep.). The mission of the Mozilla Foundation is to create an internet that is "open and accessible to all" by advocating for user choice, privacy, security, open source, and interoperability. Des. Tr. 20:16–21:14 (Baker (Mozilla) Dep.); Des. Tr. 274:1–7 (Baker (Mozilla) Dep.) (Privacy has "always been a part of Mozilla" and that Mozilla has a "strong emphasis" on it.).

[redacted]

36. Mozilla began setting Google as the default search engine on Firefox in 2004. UPX5434 at -126–27 (§ 2.4) (Mozilla SA (2004)). Mozilla switched the default search engine on Firefox to Yahoo in 2014, but switched the default back to Google in 2017. Des. Tr. 62:9–18 (Baker (Mozilla) Dep.); DX1012 at -695–96 (§ 3.3.1(a)–(b)); JX0048 at -775 (§ 1) (Mozilla SA (2017 amend.)) (adding the United States to an ongoing agreement that had previously applied only to other countries).

37. Approximately 80% of Mozilla's revenue comes from its revenue sharing agreement with Google. Des. Tr. 41:18–24 (Baker (Mozilla) Dep.).

38. Mozilla receives revenue from other general search engines, including DuckDuckGo and Bing, for non-exclusive distribution in the United States. DX1005 at -156–58 (§§ 3.1, 4.1, 5.1) (Mozilla has "the right, but not the obligation," to distribute Bing Search in exchange for [redacted]% revenue compensation); DX1011 at -309–10, -322 (§§ 2.1, 4.1, D.1(a)) (Mozilla has "the right, but not the obligation," to distribute DuckDuckGo Search in exchange for [redacted]% revenue compensation); Des. Tr. 41:10–12 (Baker (Mozilla) Dep.).

Q. Neeva

39. Incorporated in 2017, Neeva was a general search engine founded by Sridhar Ramaswamy, a former Senior Vice President for Ads and Commerce at Google. Tr. 3667:10–3668:15, 3669:15–3670:5 (Ramaswamy (Neeva)). Neeva positioned itself as an ads-free private search engine with a focus on artificial intelligence (AI) and customer personalization. *Id.* 3669:15–3670:5, 3671:2–2672:5. Neeva operated on a subscription-based model, charging customers roughly $5 a month or $50 a year. *Id.* 3675:22–3677:10.

40. In May 2023, Neeva shut down its consumer search engine and was acquired by Snowflake, an enterprise data company. *Id.* 3674:16–2675:6.

[redacted]

R. Samsung Electronics Corp.

41. Samsung Electronics Corporation, headquartered in Suwon, South Korea, is the leading manufacturer of Android devices sold in the United States. Des. Tr. 95:4–96:1, 96:3–16, 96:18–20, 96:22–97:13 (Baxter (Samsung)). Globally, Samsung is responsible for more Android activations than any other company and, across Android partners, Samsung is Google's top generator of search and Play Store revenue. UPX0639 at -266.

42. Like Google, Samsung develops branded apps and services that come preloaded on its Samsung Android devices. Samsung's Android devices come with two browsers preinstalled—Chrome and Samsung's proprietary S Browser. Des. Tr. 158:9–11 (Ezell (AT&T) Dep.); Des. Tr. 60:6–11 (Giard (T-Mobile) Dep.). Samsung's Android devices also come with two app stores preinstalled—Google's Play Store and Samsung's far less popular Galaxy Store. Des. Tr. 91:2–92:12, 92:24–93:2 (Baxter (Samsung) Dep.). Samsung's Galaxy Store is not intended as a replacement for the Play Store. Des. Tr. 91:4–92:12 (Baxter (Samsung) Dep.) (The Galaxy Store is "not a real relevant solution" and has no identifiable "benefits . . . to the market."). Instead, the Galaxy Store (1) offers a smaller, curated set of applications and (2) distributes application programming interfaces (APIs) and other software that support Samsung products and services. *Id.*. 92:16–23.

43. Samsung's innovation arm, "Samsung Next," invests in innovative technology companies that develop tools to improve the user experience on Samsung devices. Tr. 4485:17–4486:2, 4491:22–4492:16 (Chang (Samsung Next)). One of Samsung Next's investments was in Branch, which Samsung viewed as "one of the rising leaders in mobile deep linking." *Id.* 4492:17–4493:2.

[redacted]

44. Google and Samsung have been party to a MADA and RSA continuously since 2009 and 2011, respectively, and have periodically updated and extended these agreements. *Infra* ¶ 237, ¶¶ 294–303 (§ III.F.2.b.iii.a–b).

S. The Home Depot

45. The Home Depot is one of that largest home improvement retailers in the United States, selling products in stores, on its website, and through its app. Tr. 5115:2–5, 5115:10–16 (Booth (The Home Depot)). The Home Depot purchases advertising on Google and Bing, allocating roughly 90% of its ad spend to Google and around 8–10% to Bing. *Id.* 5141:18–5142:13. The Home Depot purchases Search Ads, display ads, and social ads, but these purchases are managed by two separate teams—one handles Search Ads and the other handles display and social ads. *Id.* 5117:20–5118:19.

T. T-Mobile

46. T-Mobile, headquartered in Bellevue, Washington, has sold Android devices since 2009. *Infra* ¶ 284. Approximately 50% of T-Mobile's smartphone sales are Android devices, and each of those devices comes preloaded with Google apps and services. Des. Tr. 23:16–21, 23:23–24:4, 24:6–7, 24:9–14 (Giard (T-Mobile) Dep.).

47. Google and T-Mobile have been party to an RSA continuously since 2009 and have periodically updated and extended the agreement over the last 15 years. *Infra* ¶¶ 284–287 (§ III.F.2.b.i.c).

48. Sprint, formerly headquartered in Overland Park, Kansas, began selling Android devices in 2008. *Infra* ¶ 288. Sprint had an RSA requiring default exclusivity since that time. *Infra* ¶ 288. Sprint, previously the fourth-largest carrier in the United States, merged with T-Mobile in 2020. Des. Tr. 186:16–20 (Giard (T-Mobile)); Tr. 1515:15–25 (Yoo (Google)).

[redacted]

Devices Sprint sold before the merger continue to be covered by the terms of Sprint's prior RSA. UPX5545 at -482 (§ 3) (Sprint RSA (2020 amend.)).

49. Google and Sprint had been party to an RSA continuously from 2008 to 2020, and periodically updated and extended the agreement over that time. *Infra* ¶ 288.

U. Verizon

50. Verizon, headquartered in New York, New York, has sold Android devices since 2009. JX0010 at -994 (Verizon RSA (2009)) (effective date Oct. 1, 2009). Approximately [redacted]% of Verizon's smartphone sales are Android devices, and each of those devices come preloaded with Google apps and services and are subject to the terms of a MADA. Tr. 1102:17–23, 1024:23–1025:6 (Higgins (Verizon)).

51. Verizon acquired Yahoo in June 2017. *Id.* 1043:14–18. In May 2021, Verizon announced that it was selling Yahoo to Apollo Capital. *Id*. 1072:2–13.

52. Google and Verizon have been party to an RSA continuously since 2009 and have periodically updated and extended the agreement over the last 15 years. JX0010 at -994 (Verizon RSA (2009)) (effective date Oct. 1, 2009); *infra* ¶¶ 276–283 (§ III.F.2.b.i.b).

V. Yahoo

53. Founded in 1994 and headquartered in Sunnyvale, California, Yahoo is a general search services provider and pioneer of the early Internet. DX0937 at -968, UPX1053 at -121. Verizon acquired Yahoo in June 2017. Tr. 1043:14–18 (Higgins (Verizon)). In May 2021, Verizon announced that it was selling Yahoo to Apollo Capital. *Id.* 1072:2–13.

54. Yahoo has operated a general search engine for several decades, as well as a number of web properties, including Yahoo News, Yahoo Finance, and Yahoo Sports. Des. Tr. 24:14–24 (Ramalingam (Yahoo) Dep.). As of 2020, Yahoo held 2.2% market share in the U.S.'s general search services market. *Infra* ¶ 522.

[redacted]

55. In the early 2000s, Yahoo used its own web crawler to construct a web index. Des. Tr. 35:7–18, 35:24–36:1 (Ramalingam (Yahoo) Dep.). But this ended in 2009 when Yahoo contracted with Microsoft for Bing to provide results for Yahoo in the United States beginning in the fall of 2010; Yahoo stopped serving its own search results. *Id.*; DX0271 at .001–03. Since then, Yahoo's search results in the United States have been syndicated from Bing. DX0271 at .001–03; DX1038 at -624.

W. Yandex

56. Yandex is a multinational technology company that operates the largest search engine in Russia. Tr. 2641:20–24 (Parakhin (Microsoft)); Tr. 2296:12–13 (Giannandrea (Apple)) (Yandex is "the number one search engine in Russia"). In 2017, Russian competition authorities required Google to implement a choice screen on Android devices; this resulted in a consistent and continuing loss in Google's Android query share that was acquired by Yandex. *Infra* ¶ 910.

III. INDUSTRY BACKGROUND

A. General Search Engines

57. General search engines (GSEs) answer a wide range of user queries by searching the worldwide web. Tr. 2167:1–4 (Giannandrea (Apple)) (A GSE is "a tool that you use to search the worldwide web using queries."); Tr. 182:4–13 (Varian (Google)) ("[A] [GSE] handles a wide variety of queries in different areas and provides search results that are relevant to those queries" from the web.); Tr. 3670:6–18 (Ramaswamy (Neeva)) (A GSE answers for the "vast majority" of a consumer's information needs.).

58. GSEs provide a "one-stop-shop," which allows users to find relevant information for a broad set of needs. Tr. 3670:19–23 (Ramaswamy (Neeva)) (A GSE is a "little bit of a one-stop-shop for all information needs."); Tr. 184:24–185:1 (Varian (Google)) (agreeing that users can find information for a broad set of information needs on Google and users go to GSEs

[redacted]

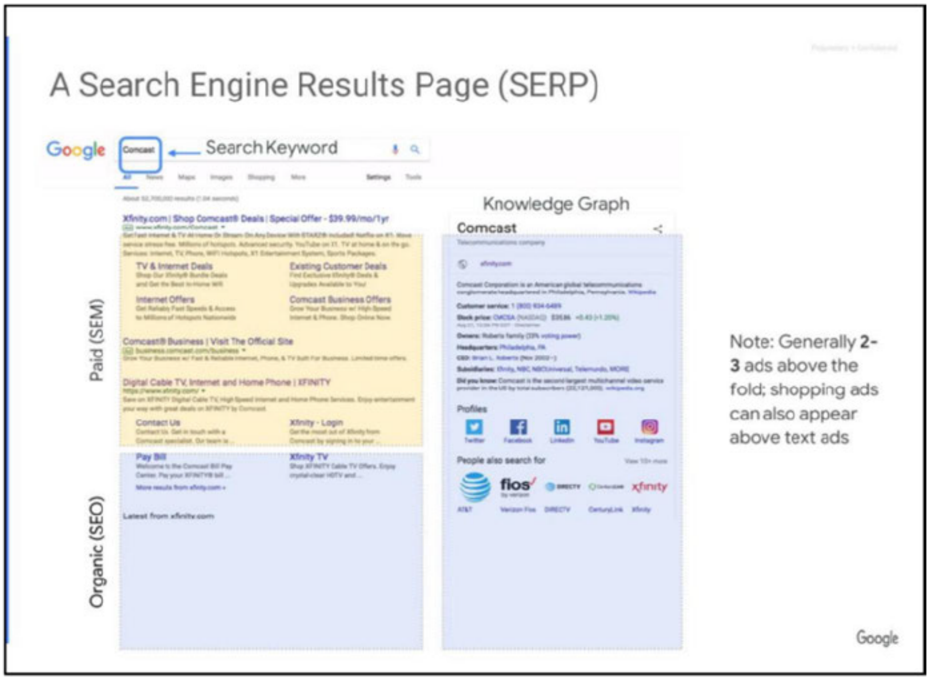
because they provide "convenience to [users]"); Des. Tr. 249:12–15; 249:20–250:15 (van Der Kooi (Microsoft) Dep.) (Tail quality is important because a "consumer . . . is most loyal to a product where all their needs are being met."); UPX0343 at -845 (Google's model is to provide good answers for all queries.); Tr. 4610:13–22 (Whinston (Pls. Expert)) (GSEs allow consumers to "both find things that they don't know about, and navigate easily to things that they do know about.").

59. A SVP differs from a GSE in that the specialized engine answers a narrow query set. Tr. 2168:20–2169:11 (Giannandrea (Apple)) (Specialized search engines such as Amazon or kayak.com "[search] a very narrow set of content."); Des. Tr. 331:25–334:15 (Connell (Microsoft) Dep.) (describing differences between GSEs and specialized search engines and noting that queries on specialized search engines are "narrower").

60. After a user enters a query, a GSE will provide results on a search engine results page (SERP). Tr. 183:9–12 (Varian (Google)); Des. Tr. 31:21–32:2 (Fox (Google) Dep.). A GSE SERP is the "broad answer from a [GSE]." Tr. 2221:14–19 (Giannandrea (Apple)). As illustrated in Figure 1 below, excerpted from a Google document, a SERP generally includes, among other search features, organic (non-paid) search results and can include paid search results (ads). UPX0001 at -532–36; Des. Tr. 20:12–23 (Jain (Google) Dep.); Des. Tr. 13:19–14:2, 14:5–23 (Moxley (Google) Dep.). Organic results are based on the average user and what is popular on the internet. Tr. 1329:7–25 (Dischler (Google)).

[redacted]

Figure 1: A Search Engine Results Page



UPX0001 at -533.

61. Organic search results often include what have traditionally been referred to as the "ten blue links." Tr. 2221:14–25 (Giannandrea (Apple)) (A query entered into a GSE provides a SERP with 10 blue links.); Tr. 1970:18–1971:5 (Weinberg (DuckDuckGo)) (Queries typically return 10 organic or "blue" links.). The 10 blue links take the user to websites the GSE deems most relevant to the user's query, based on the GSE's algorithms. Tr. 1970:18–1971:7 (Weinberg (DuckDuckGo)) (Traditional links, "[o]therwise referred to as kind of the 10 blue links[,] . . . are the links that people think about when they think of search engines. . . . And so I just mean like regular links to websites."); UPX8104 at -165 ("With the vast amount of information available, finding what you need would be nearly impossible without some help sorting through it. Google's ranking systems are designed to do just that: sort through hundreds of billions of webpages and other content in our Search index to present the most relevant, useful results in a fraction of a second.").

[redacted]

62. In addition to the 10 blue links, GSEs offer search features or content in response to a query. UPX0266 at -983, -985–86 (describing "[s]earch features" as one of "the key parts o[f] a modern search product"); Tr. 8222:3–8223:9 (Reid (Google)) (explaining how Google used structured data to provide additional information in response to a user's query). Search features come from structured data—data that is obtained from a source other than crawling and indexing the web. Tr. 8222:3–8223:9 (Reid (Google)) (explaining structured data and how it differs from information that Google collects from the web). Structured data may include sports scores, weather information, business information, and hotel prices. *Id.* (identifying game scores, hotel prices, and business hours as structured data); Tr. 2307:13–17 (Giannandrea (Apple)) (a search feature "would be something like a one box" beyond "just ten blue links"); UPX0520 at -813 (identifying weather one-box); UPX0001 at -533 (showing the knowledge graph); UPX0870 at -.004 (describing how Google displays web results alongside media news, knowledge panel, and other features) Des. Tr. 21:8–19, 21:21–22:5 (Moxley (Google) Dep.) (describing the knowledge graph as an example of structured data). An example of a structured data search feature is the onebox. Tr. 2307:13–17 (Giannandrea (Apple)).

63. On SERPs that include paid search results, paid results will typically display before the organic search results. Tr. 6523:16–6524:11 (Hurst (Expedia)); Des. Tr. 31:6–31:18 (Jain (Google) Dep.) ("[I]f you type in a query . . . there is a Search box at the top. There are some ad results. There are some organic results. There is a bunch of stuff at the bottom."). The top result on a SERP is generally the one the user is going to rely on the most. Tr. 2230:17–21 (Giannandrea (Apple)).

64. A higher position on the SERP may influence how many clicks an ad gets. Des. Tr. 315:22–316:15, 315:18–317:10 (Fox (Google) Dep.).

[redacted]

1. How General Search Engines Work

65. A GSE assembles a SERP by either building its own general search services functionality or syndicating results from a third party. UPX8052 at .004 (explaining how Google produces its search results); Tr. 2210:8–19; 2212:1–8, 2221:14–2223:6 (Giannandrea (Apple)) (explaining the fundamentals of a GSE); Des. Tr. 45:13–46:120 ((Google-NF 30(b)(6) Dep.) (explaining how a query on a syndication partner like AOL "would generate a Results page on AOL" that was "powered by Google").

66. Providing a modern GSE requires crawling the web, indexing the results, query understanding and refinement, retrieving information in response to a search query, ranking the web results, and whole page ranking to incorporate other search features. UPX0194 at -552 ("We first crawl the web to find information. Then we organize this information in the form of an index."); *id*. at -556 ("Understanding the meaning of a query is crucial to returning good answers."); *id*. at -563 (information from the index is retrieved and scored); *id*. at -566 (web and non-web results are assembled into a SERP that is served to a user in response to their query); UPX0870 at -104.003–04 (Google crawls the web for content, processes the raw web data, and uses the processed web data to create a web index, then annotates the query, retrieves and ranks webpages relevant to the query, and shows the results to the user on a SERP.); UPX0204 at -241 (depicting process for crawling and indexing, receiving and interpreting queries, retrieving and scoring documents, ranking adjustments, and serving results).

a) Crawling

67. In preparation for responding to queries, GSEs "crawl" the web and log the information available on websites. Tr. 2206:7–20 (Giannandrea (Apple)) (crawling is "step one" to building a GSE); Tr. 10274:3–10275:13 (Oard (Pls. Expert)) (describing how a GSE crawls the web to build an index); UPX0266 at -983 (crawling is one of "the key parts o[f] a modern

[redacted]

search product"). "Crawling the web means visiting webpages to find new and updated content and creating a copy of that content." UPX0870 at .003. To build a comprehensive and fresh index, GSEs must constantly crawl the web so as to log new webpages (also called websites or documents) and update pages on existing sites. *Id.* at .005; UPX9002.A at -724. As of April 2020, Google crawled 20 billion sites every day. UPX0001 at -531.

b) Indexing

68. GSEs "index" or organize crawled information. Tr. 2210:12–19 (Giannandrea (Apple)) (indexing converts results from a web crawl into a serving index); Tr. 1774:17–25 (Lehman (Google)) (information on the web is arranged and categorized to use in Google's search product); UPX0266 at -983 (key components of a modern search product include "crawl/index"); Tr. 10274:3–10275:13 (Oard (Pls. Expert)) (explaining the importance of an index to a GSE); Des. Tr. 64:5–6, 8–18, 20–22, 64:24–65:6 (Ramalingam (Yahoo) Dep.) (For Yahoo to provide its own search results without the Microsoft partnership, it would need to crawl and index the web.). A traditional search index, "[m]uch like the index you'd find in the back of a book," lists terms paired with the crawled webpages on which they appear. UPX0870 at .010. Because a search index is huge, webpages are stored in an efficient format (broken up into small pieces) that allows the webpages to be returned in response to a user query. *Id.* at .010–11; Tr. 2656:6–18 (Parakhin (Microsoft)). Creating an index is a "very expensive proposition." Tr. 1941:17–1942:10 (Weinberg (DuckDuckGo)).

c) Query Understanding And Refinement

69. Once a GSE has built an index, the GSE can search for information in response to a user's query. UPX0870 at .013. A preliminary step in responding to a user's query is query understanding and refinement. UPX0870 at .016–17. In this step, the search engine will take the "raw" query and parse it to better understand the user's intent. *Id.*; UPX0266 at -984 ("Given a

[redacted]

query, you want to find candidate docs quickly (the search part)[.] But first you need to understand if the query typed is the query that was intended[.] Spelling is the biggest problem here[.] Followed by synonyms . . . ."). "Among the things that happen during query understanding and refinement are: "[s]pelling correction" and "[s]ynonym expansion." UPX0870 at .016. "For example, the query [evening commute nj transit] may get refined to include the intent (traffic conditions), time (6pm), and the carrier (New Jersey Transit)." *Id.* at .017.

d) Retrieval

70. The GSE will then use the query to retrieve or identify relevant webpages from the index. Tr. 1776:1–5 (Lehman (Google)); UPX8102 at -160 (Google Search instantly matches searches "sort[ing] through hundreds of billions of webpages and other information in [Google's] Search index to find the most relevant, useful results.").

e) Ranking

71. After retrieval, the GSE will "rank" or sort retrieved websites according to how relevant they are to the query. Tr. 2268:17–2269:14 (Giannandrea (Apple)); UPX0266 at -984. Ranking retrieved webpages allows the GSE to determine which subset to display, and which get the higher placement. UPX0870 at .017–20.

f) Whole Page Ranking

72. Once all web results have been ranked, GSEs must determine which types of results it will show the user. UPX0869 at -866–67. The optimal SERP may require a combination web and non-web results. *Id.* at -867; UPX0870 at .019–20. For example, a query like [star wars] could result in a SERP with "the Wikipedia page, a KnowledgePanel about the movie series, videos of the latest trailers, or even a Local block with opening hours for the Disney theme park if the user is near Anaheim." UPX0869 at -867.

[redacted]

B. General Search Competition

1. Search Competitors

73. General search competitors—all of which are significantly smaller than Google in the United States—include Bing, Yahoo, DuckDuckGo, You.com, Ask.com, Brave, and Ecosia. Tr. 1232:22–1233:18 (Dischler (Google)); Tr. 8093:10–8094:5 (Gomes (Google)); Tr. 2167:21–2168:4; (Giannandrea (Apple)); Tr. 2169:17–22 (Giannandrea (Apple)); Tr. 1942:11–21 (Weinberg) (DuckDuckGo)); UPX0599 at -698 (2008 email by Barton (Google) identifying Ask.com as offering web search); UPX0913 at -017 (Dr. Varian's presentation listing Google, Bing, and DuckDuckGo as "general purpose" search engines). Outside of the United States, GSEs include Yandex (in Russia), Baidu (in China), and Naver (in South Korea). Tr. 2720:5–2721:5 (Parakhin (Microsoft)); Tr. 7124:24–7125:14 (Baker (Mozilla)).

a) Independent Versus Syndicated Engines

74. Search syndication occurs when one search engine is powered by, and receives results from, another in a white-label manner. Tr. 3520:13–22 (Nadella (Microsoft)); Tr. 320:10–20 (Barton (Google)) ("[S]yndication . . . is when you're powering someone else's search."). GSEs, which are typically free for users and funded by the sale of ads, can operate independently or through a syndication agreement with an independent GSE. Tr. 7345:8–19 (Raghavan (Google)) (Revenue from advertising supports Google's search engine.); Tr. 184:11–12 (Varian (Google)) (GSEs are funded by the sale of ads); UPX0119 at -534 (Google analyzing its search syndication partnership with Yahoo in the U.S.).

75. Google and Bing are the only meaningful companies that independently own all the elements of a GSE. UPX0332 at -673 (Google listing only itself and Microsoft (Bing) as "general purpose search engines"); UPX0266 at -983 (Giannandrea (Apple)) ("there are so few serious contenders in [general web search] because of the depth of R&D needed"); UPX0333 at

[redacted]

-116 (Varian declaring that "Google is [an] ad supported general purpose search engine. There aren't very many of these in part because they are very expensive to build and maintain"); Des. Tr. 105:18–106:24 (Connell (Microsoft) Dep.) ("there are only a few search systems on the planet that allow you to understand queries and crawl the web and index the Internet").

76. Nearly all other GSEs in the United States syndicate results from Google or Bing. Tr. 2061:18–2062:9 (Weinberg (DuckDuckGo)) (when considering syndication partners, DuckDuckGo looked at [redacted]); Des. Tr. 279:14–17; 279:19–25; 280:2–7 (Stein (IAC) Dep.) (Ask.com syndicates from Google and Bing); Tr. 5916:10–19 (Whinston (Pls. Expert)) (including DuckDuckGo and Yahoo in market share statistics is conservative as they syndicate results from Bing and are not clearly independent competitors). Yahoo and DuckDuckGo, the two major syndicated GSEs in the United States, syndicate from Microsoft's Bing. Tr. 3520:13–22 (Nadella (Microsoft)); Des. Tr. 34:25–35:18, 35:24–36:8 (Ramalingam (Yahoo) Dep.) (although Yahoo used to crawl and index the web, it now gets results from Microsoft).

b) Differentiation In General Search Engines

77. Bing and Yahoo offer general search engine experiences similar to Google. Bing is Google's most significant competitor among GSEs. Tr. 8094:8–10 (Gomes (Google)); UPX0888 at -852 (Bing mimics Google in "look-and-feel" and if "Apple switches to Bing" from Google as its default, "most people won't even notice a difference."); Des. Tr. 216:3–217:2 (Baker (Mozilla) Dep.) (Bing, Yahoo, and Google would be products able to "fulfill the search engine function" in the Firefox browser.). DuckDuckGo, however, offers a GSE that emphasizes privacy. Tr. 1945:9–1946:4, 1947:3–1948:25 (Weinberg (DuckDuckGo)); UPX0408 at -030–36 (identifying DuckDuckGo as a "privacy-focus[]ed search engine[]").

[redacted]

78. Neeva offered a different approach to user privacy: a subscription-based GSE with no ads. Tr. 3671:2–3672:11 (Ramaswamy (Neeva)) (Neeva sought to create a search engine not beholden to advertisers). Specifically, Neeva differentiated itself through privacy, personalization, generative AI, and being ads-free. Tr. 3718:25–3719:16 (Ramaswamy (Neeva)).

2. Potential Search Competitors

79. Tools and services that are designed to search the contents of mobile apps are not substitutes for general search services today. Tr. 5851:5–5852:5 (Whinston (Pls. Expert)) (discussing Branch and UPX0694). Such app-search tools do not require their developers to index the web, and their core service does not involve returning web results in response to user queries. Tr. 2957:3–18 (Austin (Branch)) (Branch does not indexed the web); Tr. 847:23–848:9 (Kolotouros (Google)) (on-device search explores what is on the phone, even when it is not connected to the web).

80. For example, Branch offers an app-search tool that includes, among other things, an on-device search service. Tr. 2894:3–18 (Austin (Branch)) (Branch allows a user to search across app pages and then be directed to the app); Tr. 2789:12–18 (Kartasheva (Google)) (Branch indexes app content to allow users to search within those apps and can show customized ads to those users based on user activity.); *id*. 2796:20–2797:17 (Branch uses deeplinking); Tr. 4497:2–13 (Chang (Samsung Next)) (explaining that Branch was integrated with S Finder, Samsung's on-device search product).

81. Some large distributors also provide search features. For example, although Apple does not operate a GSE, Tr. 2206:2–3 (Giannandrea (Apple)), it provides users certain search capabilities through Spotlight, Siri, and Suggestions, *supra* ¶¶ 8–10. Apple's goal is to "give answers when we ha[ve] them" and "get people where they're going faster[.]" *Id*. 2282:14–20.

[redacted]

Apple has invested significantly in search technology to enable these features and could leverage this technology to answer more queries in the future. *Infra* ¶¶ 1093–1119 (§ VIII.B.3.a).

3. Evolution From Desktop To Mobile

82. Before 2010, very little if any general searches occurred on mobile phones. Tr. 3097:13–3099:03 (Tinter (Microsoft)) (When Bing first launched in 2009, most searches were on desktop); Tr. 316:1–9 (Barton (Google)) (When he joined Google in 2004, people used feature phones, which were "very basic phones" from companies like Nokia and Motorola). Since 2010, the number of mobile phone searches has grown rapidly. *Id*. 317:6–20 (between 2011 and 2013, mobile search became "a very significant portion of all search."); Tr. 3663:7–18 (Nadella (Microsoft)) (in the early 2010s, mobile grew to be "the dominant platform" for search); UPX0006 at -330 (2019 Google deck showing actual and projected percentages of mobile, desktop, and tablet revenues and queries for 2018–2023).

83. Today, more than half of all general searches occur on mobile phones. Tr. 3097:13–3099:03 (Tinter (Microsoft)); UPX0006 at -330 (Google 2019 "Search State of the Union" with chart showing actual and projected percentages of mobile, desktop, and tablet revenues and queries for 2018–2023). "[T]he user behavior dynamics on mobile tend to be different than they are on PC, right." Tr. 3102:12–3104:25 (Tinter (Microsoft)); Tr. 329:21–330:1 (Barton (Google)). Some of this differentiation is a function of smaller screen real estate, and lack of keyboard. Tr. 9764:2–18 (Murphy (Def. Expert)) (conceding that a difficulty exists in changing the default on mobile devices because it lacks a keyboard and the screens are smaller); Tr. 1628:25–1629:4 (Roszak (Google)) (discussing UPX1050, agreeing that keyboards and screen size are different on mobile); Tr. 3102:12–3104:25 (Tinter (Microsoft)).

[redacted]

C. Advertising, Including Search And Text Ads

84. The primary objective of all advertisers is to sell their product or service. Tr. 1371:12–24 (Dischler (Google)). Advertising is used to capture the attention of consumers, educate them, and drive them forward to a conversion, which for a product or service is a purchase. Tr. 3814:25–3815:13 (Lowcock (IPG)).

85. Google monetizes its general search services with the sale of Search Ads, which provides most of Google's revenues. Tr. 7345:8–19 (Raghavan (Google)); Tr. 184:11–12 (Varian (Google)); UPX8065 at -773 (2021 total revenues of $258 billion and "Google Search & other" revenues of $149 billion); UPX7002.A (2021 "Search+" revenues of $146 billion and operating profit of $[redacted] billion); Tr. 1137:2–14 (Dischler (Google)) (Approximately two-thirds of Google's revenues are from Search Ads.).

86. Online or digital advertising (including Search Ads) spending dominates the multi-billion-dollar U.S. advertising industry. For example, in 2021 alone, advertisers spent an estimated $316 billion on advertising across all media in the United States. Approximately one-third of this spend was on traditional (non-digital/offline) advertising, while the remaining majority of spend—approximately $211 billion—was on digital advertising. Tr. 5377:11–19 (Jerath (Pls. Expert)) (discussing UPXD103 at 3 (Total of amounts in 2021 U.S. "Total Media Ad Spending, by Media" chart is $315.79 billion.)). Digital advertising includes ads on digital properties, such as on search engines, online websites, social media platforms, connected television, and other digital channels. Tr. 3803:9–16 (Lowcock (IPG)).

87. Traditional advertising includes television, print (e.g., newspaper and magazines), radio, and "out of home" (e.g., billboards). Tr. 5377:20–5378:5 (Jerath (Pls. Expert)) (discussing UPXD103 at 3).

[redacted]

1. Overview Of Digital Advertising

88. By ad spend, the two largest digital ad channels are display ads and Search Ads (including Text Ads). Tr. 5378:6–14 (Jerath (Pls. Expert)) (discussing UPXD103 at 3); UPX0006 at -329 (Oct. 2019 Google "Search State of the Union"). In 2021, U.S. Search Ad spend was approximately $86 billion. Tr. 5378:6–14 (Jerath (Pls. Expert)) (discussing UPXD103 at 3); DX0407 at -633 (MAGNA 2021 report predicted U.S. Search Ad revenue growth of 23.2% from $70 billion in 2020, which is approximately $86 billion in 2021.). Google sells both Search Ads and display ads.

a) Search Advertising

89. Search advertising (Search Ads) includes any ad that is served on a search engine results page in response to a consumer's real-time search query. Tr. 3803:21–3804:15 (Lowcock (IPG)) ("Search advertising can be defined as advertising that you buy [that is shown] in response to people conducting a search on a search engine or platform."); Tr. 3989:23–3990:5 (Juda (Google)); Tr. 5392:3–5393:9 (Jerath (Pls. Expert)) (Search Ads are "anything that is in response to a query."); Des. Tr. 20:24–21:13 (Jain (Google) Dep.); Des. Tr. 54:15–20 (Ramalingam (Yahoo) Dep.). Search Ads can appear on both GSEs and on SVPs. Tr. 3853:3–15, 3925:24–3926:5 (Lowcock (IPG)); Tr. 5379:21–5380:14 (discussing Search Ads shown on UPXD103 at 4–5).

90. On a general search engine SERP, Search Ads are not shown in response to all queries, but instead on a subset. UPX0010 at -053 & n.6 (As of January 2020, "the vast majority of queries[–about 80%–]don't show any ads at all."); Tr. 8396:16–8398:17 (Israel (Def. Expert)). Search Ads on a GSE appear on SERPs in response to queries showing commercial intent, often when a user is contemplating purchasing a product or service. Des. Tr. 110:10–24 (Fox (Google) Dep.) (A commercial query is one where a user is "looking to conduct . . . a transaction for a

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product or service."); Tr. 3686:22–3687:8 (Ramaswamy (Neeva)) (Queries for products or services have "strong commercial intent," and political queries are also "commercially-oriented" before an election.); Tr. 398:13–399:2 (Varian (Google)).

91. GSEs that show Search Ads in the United States include independent GSEs such as Google, Bing, and Brave, as well as syndicated GSEs such as Yahoo, DuckDuckGo, Ask.com, and You.com. Tr. 5230:12–19, 5231:8–20 (Dijk (Booking.com)) (naming Google, Bing, and DuckDuckGo); Tr. 5125:19–20, 5126:1–13 (Booth (The Home Depot)) (naming Google, Bing, and adMarketplace); Tr. 6565:13–19 (Hurst (Expedia)) ("The only real comparable for the text ads [on Google] would be Bing."); Des. Tr. 21:4–12 (van der Kooi (Microsoft) Dep.) ("The search advertising marketplace is a marketplace where advertisers participate by buying specific search ads for generic search engines like Google and Microsoft Bing."); UPX0913 at -017 (Dr. Varian listing Google, Bing, and DuckDuckGo as ad-supported "general purpose" search engines).

92. Specialized search engines that show Search Ads in the United States include Amazon.com, travel websites like Expedia.com, app stores like Apple's App Store, and Google Maps. Tr. 5380:9–14 (Jerath (Pls. Expert)) (discussing UPXD103 at 5 (illustrating Search Ads on Amazon.com and Expedia.com)); Tr. 5117:1–5 (Booth (The Home Depot)) (identifying Apple's App Store); PSX00340 at -179 (discussing Search Ads on Google Maps); UPX0334 at -085 (identifying "special purpose search engines": Amazon.com, Apple (also offers maps), Google, Facebook, and Microsoft); UPX0913 at -017 (Dr. Varian listing Amazon, eBay, Yelp, Travelocity, TripAdvisor as ad-supported "special purpose" search engines).

93. Search Ads includes Text Ads, *infra* ¶¶ 102–107 (§ III.C.1.b), ¶¶ § III.C.1.b, as well as shopping ads, hotel ads, travel ads, Amazon sponsored product ads, map ads, and app

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store ads. Tr. 5442:17–25 (Jerath (Pls. Expert)); Tr. 1177:2–4 (Dischler (Google)) (Text Ads and shopping ads are Search Ads.); Tr. 3922:10–3923:6 (Lowcock (IPG)) (Search Ads include Text Ads and shopping, local, travel, and vertical search ads.); Tr. 5236:11–13 (Dijk (Booking.com)) (Text Ads and hotel ads are Search Ads.); Tr. 5113:12–21, 5117:1–5, 5120:3–11, 5125:5–18 (Booth (The Home Depot)) (Paid search includes Text Ads, shopping ads, and app store ads.); UPX0032 at -144–50, -164–70 (depicting Text Ads, shopping ads, app ads, hotel ads, and map ads).

94. Figure 2 below, excerpted from a Google document, shows the components of Google's mobile SERP and identifies the query, Text Ads, shopping ads, and organic results. UPX0012 at .004; Tr. 1182:3–5 (Dischler (Google)) (UPX0012 at .004 depicts three shopping ads next to a Text Ad.). Other examples, including of desktop SERPs, also appeared at trial. Tr. 5379:21–5380:5, 5380:9–14 (Jerath (Pls. Expert)) (UPXD103 at 4); UPX0012 at .003. For an example of a desktop SERP, see Figure 1, *supra* ¶ 60.

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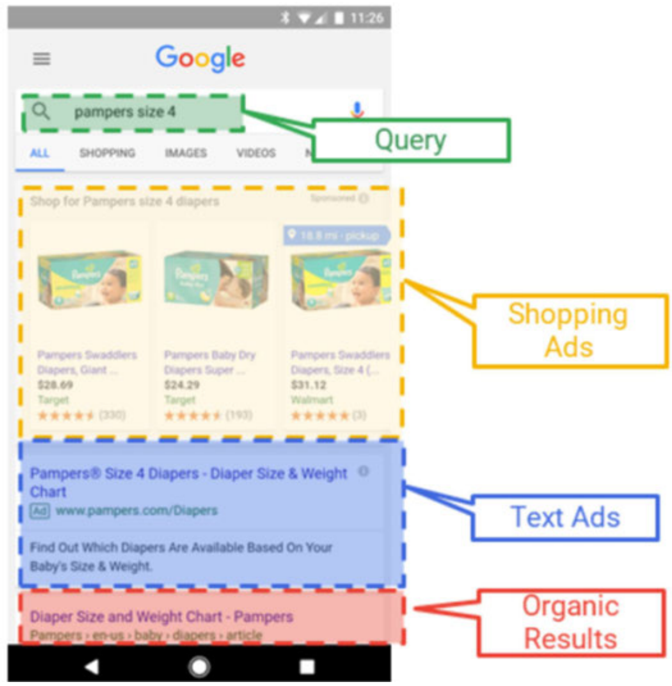
Figure 2: Mobile Search Engine Results Page



UPX0012 at .004.

95. Shopping ads on google.com were formerly called Product Listing Ads, or PLAs, and the term PLA continues to be used interchangeably with shopping ad. Tr. 407:5–13 (Varian (Google)); Tr. 1181:16–24 (Dischler (Google)) (Shopping ads and PLAs are synonymous.); UPX0915 at -063 (Shopping ads were formerly known as ("f.k.a.") "Product Listing Ads."). As reflected in Figure 2, shopping ads—also know as product listing ads (PLAs)—are visual ads specific to an Individual physical product. Shopping ads feature the image, name, price, and short description of the product; link directly to a page where the user can purchase the product; and are targeted using a product feed. UPX6032 at -652 (Google admission (Resp. 3) that shopping ads "typically include an image, a price, a title, and a store name"); Tr. 407:15–408:3, 424:1–3 (Varian (Google)) (Shopping ads or PLAs show one product per ad, include a picture and a price, identify the seller, and take users to the advertiser's website); UPX0032 at -145

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(depicting shopping ads); Des. Tr. 17:18–28:2 (McAteer (Google) Dep.) (PLAs can only display a single product).

96. The shopping ads carousel on google.com can include shopping ads for products from different sellers. Tr. 1350:12–18 (Dischler (Google)); UPX0032 at -145; UPX0012 at .004 (depicting shopping ads for same product from different sellers) (shown in Figure 2, *supra* ¶ 94).

97. Similar to shopping ads are Amazon sponsored product ads, which appear on amazon.com. Tr. 5379:21–5380:5, 5380:9–14, 5437:17–5438:4 (Jerath (Pls. Expert)) ("When you think of Amazon, shopping ads are sponsored product ads"; discussing UPXD103 at 4–5); Des. Tr. 141:4–7 (Jain (Google) Dep.) (Searches that give rise to PLAs are comparable to Amazon ads.).

98. Hotel ads or travel ads appear on google.com and travel websites like Expedia. Tr. 5380:9–14 (Jerath (Pls. Expert)) (discussing UPXD103 at 5); Tr. 9195:8–21 (Holden (Google)); Tr. 5232:2–11 (Dijk (Booking.com)) (Google hotel ads are a price comparison tool that Google puts into the paid search results.); Des. Tr. 36:25–37:9 (Silverman (Google) Dep.) (Hotel ads include booking links, promoted hotels, and hotels commercial unit.); UPX0032 at -164–65, -170 (depicting Google hotel ads). Hotel ads are served using a product feed—like a PLA—that includes all of the rate and occupancy information for a particular brand and location. Des. Tr. 66:25–67:15 (Alberts (Dentsu) Dep.).

99. Map ads include information such as the advertiser's address, customer rating, and hours of operation. UPX0032 at -166–67 (depicting map ads on google.com and the Google maps immersive).

100. App store ads can appear on google.com, Apple's App Store, or on Google Play. UPX0032 at -148 (example of Play Store ad). For example, The Home Depot purchases Search

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Ads on Apple's App Store to "prompt people to download The Home Depot app." Tr. 5113:12–16, 5115:22–5116:2, 5117:1–5 (Booth (The Home Depot)); UPX0032 at -147–48 (depicting app ads on google.com and Google Play).

101. Search Ads are typically sold on a cost-per-click (CPC) basis, also referred to as a pay-per-click (PPC) basis, meaning advertisers only pay when a user clicks on a Search Ad. Tr. 1176:6–9, 1177:12–20, 1178:21–22, 1184:1–6, 1195:6–16, 1335:9–13 (Dischler (Google)); Tr. 5430:15–18 (Jerath (Pls. Expert)); UPX0001 at -543; Tr. 3991:18–3992:21 (Juda (Google)); Tr. 401:4–6 (Varian (Google)); Tr. 5119:13–5120:2 (Booth (The Home Depot)); UPX0032 at -144–49, -157, -164–65, -167–70 (noting when Google recognizes Search Ads revenue for different Search Ads). Merely showing a Search Ad to a user is free to the advertiser. Tr. 4016:6–13 (Juda (Google)); Tr. 1177:12–20, 1178:3–1179:7, 1179:10–12, 1184:1–6 (Dischler (Google)) (agreeing "[i]mpressions in paid search are free."); UPX0001 at -538–39; UPX0842 at -001.

b) Text Advertising

102. General search text ads (Text Ads) are a particular type of Search Ad that are shown in response to a consumer's real-time query entered on a GSE, matched by keywords selected by the advertiser. Tr. 1185:16–19 (Dischler (Google)); Tr. 3809:13–23 (Lowcock (IPG)); UPX0032 at -144 (illustrating a Text Ad).

103. Text Ads appear similar to organic results and consist primarily of text. Tr. 5379:21–5380:8 (Jerath (Pls. Expert)) (identifying Text Ads as contained in the red rectangle in UPXD103 at 4); Tr. 1179:22–1180:2 (Dischler (Google)) (referring to UPX0012 at .005); Tr. 3810:9–23 (Lowcock (IPG)) (referring to UPX0012 at .005); Tr. 3994:10–22 (Juda (Google)) (discussing UPX0032 at -144); Des. Tr. 21:17–22:1 (Miller (Google) Dep.) (Text Ads are

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"essentially our traditional search ad business which is primarily text-based. It looks a lot like an organic search result . . . .").

104. Text Ads typically contain a URL, one to three headlines, and one or two descriptive lines of text. Tr. 1179:22–1180:2 (Dischler (Google)); UPX0012 at .005; UPX0032 at -144; Tr. 3995:7–10 (Juda (Google)); Des. Tr. 60:8–16 (Silverman (Google) Dep.) (Text Ad is "an ad format that shows on Google Search" with "a simplified URL for the partner, a clickable headline, and a line of body text."). Generally, no more than seven Text Ads are shown per Google SERP (up to four at top and up to three at bottom). UPX0010 at -052–53; Des. Tr. 41:6–9, 41:12–43:4 (Fox (Google) Dep.) (detailing the number of Text Ads typically shown on the SERP and changes to these numbers over time); UPX0001 at -533 (There are generally 2–3 Text Ads above the organic results.).

105. Text Ads differ from organic results in at least two key ways. First, with Text Ads, the advertiser determines the ad's message, whereas with organic results, the GSE determines the result. Tr. 3810:9–23 (Lowcock (IPG)) (referring to UPX0012 at .005); UPX0452 at .006 (Dr. Varian writing, "[G]oogle chooses the creative for organic ads, but the advertiser chooses the creative for the ad."); PSX00092 at -183, -187–89 (Text Ads "provide[] added control [and] flexibility across auctions," including to "[c]ustomize your message to your customer's needs." (emphasis omitted)); Tr. 5440:6–19. (Jerath (Pls. Expert)). Second, with Text Ads, advertisers have more control over whether they appear on the SERP via their keyword bidding and campaign selections, and advertisers can change, add, or discontinue Text Ads instantly. UPX0926 at -684–88, -691–98 (IPG training materials explaining different ways to refine when Text Ads are shown); Tr. 5440:6–19 (Jerath (Pls. Expert)); UPX0425 at -281–82.

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106. By contrast, advertisers have very limited control over whether or where they appear in the organic results; efforts to improve position among organic listings—referred to search engine optimization, or SEO—can take weeks or months to yield results, if improvement occurs at all. Tr. 5440:2–5441:18 (Jerath (Pls. Expert)); UPX0441 at -802 (internal JPMorgan document: "Paid search copy can be changed and tested much faster than it can be on the organic side, helping us learn quickly what language works so that we can use to better inform other marketing messages." (emphasis omitted)); UPX0450 at .011 (IPG client presentation comparing paid search and organic search); UPX1131 at -375 (Apple recognizes the importance of paid search because it can "launched within minutes after Tim [Cook (CEO)] walks off the stage" at a product launch, but with SEO, it "can take a few hours or possibly days for SEO rankings to appear."); UPX8057 (Google guide on how SEO works).

107. In fact, Google views Text Ads and SEO as complements and recommends that advertisers use them together. PSX00092 at -181, -186, -191 (Google presentation ("SEO + SEM = Better Together") advising that Text Ads "compliment[] SEO" and that "[t]he combination of paid and organic search creates synergies and the highest share of clicks."); UPX0425 at -271–79 (describing benefits of an SEO-and-paid-search strategy).

c) Display Advertising, Including Advertising On Social Media

108. Display advertising (or display ads) are pictorial-based ads, such as banner ads or video ads, shown on websites across the Internet. Tr. 1193:2–18, 1195:22–25, 1347:3–7 (Dischler (Google)) ("Banner ad" is (1) a pictorial ad that is a type of display ad and (2) run across websites on the Internet.); Tr. 5378:15–17 (Jerath (Pls. Expert)) ("[D]isplay ads are basically banner ads and also video ads on websites and apps on desktop and mobile phones."); Tr. 3818:12–3819:5 (Lowcock (IPG)).

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109. Ads on social media sites such as Facebook, Pinterest, or TikTok are considered a form of display ad. Tr. 5392:3–5393:9 (Jerath (Pls. Expert)) ("[T]he vast majority of advertising on social media is display."); Tr. 457:19–22 (Varian (Google)) (Facebook delivers display ads.); Tr. 3838:9–3839:3 (Lowcock (IPG)) ("Social advertising can occur across a number of social platforms, so Snapchat, Pinterest, Facebook, Instagram."); *id.* 3839:23–3840:2 (Social media ads are "display-type" ads.); *id.* 3927:25–3928:14 (TikTok is a social media platform.); Des. Tr. 260:21–261:2 (van der Kooi (Microsoft) Dep.) ("Social ads, in my view, are just a form of targeted display ads. There is a category that is created around it mostly by Facebook, but, really, that's all it is. It's a targeted display ad."). And display ads on social media are sometimes referred to as social ads. Des. Tr. 260:21–261:2 (van der Kooi (Microsoft) Dep.).

110. Indeed, although Search Ads can appear on Facebook, they compose a very small percentage of Facebook's ads. Tr. 5392:3–5393:9 (Jerath (Pls. Expert)) (Search Ads on Facebook is "very, very small. It's not really a big phenomenon at all."); Tr. 8772:13–16 (Israel (Def. Expert)) (Search Ads are "a very small percentage on Facebook."); Des. Tr. 154:22–23, 155:1–3, 155:5–10, 155:15–156:6, 156:20–159:8 (Levy (Meta) Dep.) (Search Ads accounted for [redacted]% of Facebook ad revenue in April 2021 and [redacted]% in October 2020 (discussing UPX1019 (dep. exs. 17 & 18) and UPX2116 (dep. ex. 16))); UPX1019 at -524 (Facebook "Weekly Ads XFN Report"); UPX2116 at -154 (Facebook "Ads Weekly" revenues); UPX2113 at -789 (listing over 20 places an ad can appear on Facebook, Instagram, and other Meta properties with "Search" far down the list and limited to Facebook).

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111. Google also has social ads, called Demand Gen or Discovery Ads or Campaigns.[3] Demand Gen ads appear on Google's "feed" products, are not displayed in response to a query, and are modeled on the format of ads displayed on Facebook and Instagram. Tr. 1196:15–1197:5, 1347:11–17 (Dischler (Google)); UPX0033 at -117 ("Discovery ads . . . allow[] advertisers to extend the reach of their social ads to 2.9B+ Google users."). Indeed, Google launched discovery ads to compete with social ads, because "[d]iscovery ads provide a familiar pitch to social buyers." UPX0033 at -145 (2020 presentation) (discussed at Tr. 4646:9–4647:7, excerpted in UPXD102 at 32, and shown in Figure 3, *infra* ¶ 427); UPX0033 at -130 ("Social buyers want inventory like social feeds.").

112. Another type of display ad—retargeted display ads—is targeted at consumers who have recently visited an advertiser's website but who have not taken a desired action (e.g., made a purchase). Tr. 5445:12–5448:9 (Jerath (Pls. Expert)) (discussing UPXD103 at 20). As Dr. Varian acknowledged, a retargeted display ad can only be used after the consumer has visited a merchant's website. Tr. 455:25–456:5 (Varian (Google)); UPX0414 at -697; UPX0026 at -764; Tr. 5445:24–5447:13 (Jerath (Pls. Expert)) (discussing UPXD103 at 20). Moreover, "[m]ost of the value of retargeted ads occurs in the first hour or so after the user visits the advertiser's web page." UPX0026 at -765; Tr. 456:18–457:17 (Varian (Google)) (acknowledging authorship of UPX0026 and adopting the observation as true); *id.* 456:6–17 (agreeing the "value of retargeted ads fades over time").

113. Display ads are typically priced per impression, i.e., when the ad is shown. Tr. 5430:19–5431:5 (Jerath (Pls. Expert)); Tr. 5119:19–5120:2, 5120:15–21 (Booth (The Home

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[3] Demand Gen ads were formerly known as Discovery Ads, but Google recently rebranded them. Tr. 7537:20–7538:8, 7543:17–7544:3 (Raghavan (Google)) (Discovery ads were renamed "Demand Gen" ads and are aimed at buyers of social ads.).

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Depot)) ("Display is more of a CPM, or a cost per thousand impressions, which is buying a volume of times that an ad is shown"); Tr. 3821:6–20 (Lowcock (IPG)). Advertisers are charged regardless of whether anyone clicks on their ad. Tr. 1195:6–16 (Dischler (Google)) ("[With CPM,] you would pay a certain rate for 1,000 impressions of the ad, 1,000 people who may or may not be seeing the ad but it's being rendered on the page. In contrast, if you're on a cost-per-click basis, that means that you have to actually click on the ad, interact with the ad in order to pay for it.").

2. Targeting Digital Ads

114. Targeting refers to an advertiser's effort to put their ad in front of the people with whom the advertised product or service would most resonate. Tr. 5389:3–8 (Jerath (Pls. Expert)). Depending on format, advertisers can target digital ads using (1) declared intent in real time via a query or (2) inferred intent from signals. *Id*. 5389:3–5390:20; UPX0025 at -009 ("Major difference between Search vs Display & YouTube" is "intent" (search) and "audience" (display and video).).

a) Declared Real Time Intent

115. Declared intent in real time refers to when a consumer declares what they want, i.e., their intent. Tr. 5390:6–15 (Jerath (Pls. Expert)). For example, when a consumer types a query into a search engine, they are expressly telling the search engine that, at that exact moment in time, they are interested in the query's subject matter. *Id*. 5390:6–15 (likening it to a consumer visiting a store and telling a salesperson what they want at that moment (referencing his testimony at Tr. 5386:6–5387:25)). As the query is a statement of intent, no inferences are needed. *Id*. 5390:16–20.

116. A consumer query entered on a search engine is a powerful signal of the consumer's intent and interest. Tr. 4854:5–13 (Lim (JPMorgan)) (Search is one of the strongest

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intent signals because it responds directly to a query, which is "unique to paid search."); Tr. 9234:1–8, 9284:6–9 (Holden (Google)) (Users "express[] intent through a query," and "[s]earch is a powerful intent signal that can be utilized on many different sites."); Tr. 404:17–20; 405:18–406:7 (Varian (Google)); UPX0441 at -802 (Search queries are "some of the strongest intent signals made available," and "search can capture a consumers['] intent to transact . . . at its highest point."); UPX0910 at -753 ("The vast majority of our [Google's] profits come from search ads, because the signal is [so] strong."); Des. Tr. 56:11–57:14 (Utter (Microsoft) Dep.) ("In a search engine, you are describing your intent with a very firm signal, a query."); Des. Tr. 137:2–8, 139:2–23 (Levy (Meta) Dep.) (Facebook analysis (UPX1020 at -504 (dep. ex. 13)) in 2020 assumes prices for intent Search Ads ("US Intent Search CPM") are far higher than for inferred intent ads ("US FB Inferred Intent CPM").); Tr. 5390:16–20 (Jerath (Pls. Expert)).

117. As Dr. Varian acknowledged, a search query is a very strong predictor of the type of ad content that would be most relevant to the user. Tr. 404:17–406:7 (Varian (Google)) (agreeing that query for "cheap blue blender" is a signal the consumer is interested in cheap blue blenders). This is especially valuable because the advertiser's goal is to connect with consumers who have expressed interest in the advertiser's product or service. Tr. 9236:8–15 (Holden (Google)) ("The [advertiser's] goal is to connect . . . with a user who has expressed interest in their product or service.").

b) Inferred Intent

118. When using inferred intent, advertisers look for signals in consumer data from which the advertiser could determine the subject matters in which a consumer may be interested. Tr. 5389:9–5390:5 (Jerath (Pls. Expert)) (discussing UPXD103 at 7); Des. Tr. 284:20–285:6 (Alberts (Dentsu) Dep.) (Implied intent "needs to be inferred based on what we know about a

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consumer and they may not expressly share what their intent is.”). This is sometimes called “audience targeting.” UPX1005 at -188 (Google document on “Search Ad Themes”); UPX8016 (Google Ads Help: “About audience targeting”); UPX0913 at -021 (Google “Online Ads” presentation by Dr. Varian). Such signals in the data (or data signals) include expected audience composition (e.g., demographics), behavioral profiles based on past or recent online behavior, and context. Tr. 5389:9–5390:5 (Jerath (Pls. Expert)) (discussing UPXD103 at 7); Tr. 1418:17–1420:3 (Dischler (Google)) (User’s website visits and video views are signals of the user’s intent.); UPX0926 at -684–87 (IPG training materials on targeting Search Ads); UPX8019 (Google Ads Help: “About demographic targeting”); UPX8027 (Google Ads Help: “About targeting geographic locations”).

119. Although signals from which intent is inferred can be useful, they also can be low information and limited in accuracy. Tr. 5389:9–5390:5 (Jerath (Pls. Expert)). Thus, if a person is reading an article about an earthquake in Haiti, that does not mean they are interested in vacationing there. UPX0026 at -772 (Dr. Varian’s “Online advertising primer”: “[I]t is almost impossible to contextually target news. What do you show next to a story about a hurricane in Haiti? Travel ads for Haiti? Probably not.”). Similarly, the signal may be old, making it unclear whether the consumer is still interested in what they saw previously. Tr. 5389:9–5390:5 (Jerath (Pls. Expert)); Tr. 426:7–13 (Varian (Google)) (agreeing the farther away in time “from a search or an indication of interest in a product, the less value that signal has”). For example, a consumer who searched for a tennis racquet three days ago may no longer be interested in tennis or may have already purchased a racquet. Tr. 424:19–426:13 (Varian (Google)); UPX0910 at -753.

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c) Traditional, Display, And Social Ad Channels Are Based On Inferred Intent And Are Most Suited For Generating Demand

120. Traditional advertising is targeted based on inferred intent from signals, such as expected audience composition or demographics of who may be interested in the advertiser's product or service. Tr. 5389:9–5390:5, 5391:10–23 (Jerath (Pls. Expert)) (discussing UPXD103 at 7–8); Tr. 3826:11–3827:11 (Lowcock (IPG)) (TV, radio, and out-of-home (e.g., billboard) ads build awareness and interest among consumers, resulting in searches.).

121. Display ads are also targeted based on inferred intent from signals, often behavioral profiles based on online behavior. Tr. 5389:9–5390:5, 5391:10–23 (Jerath (Pls. Expert)) (discussing UPXD103 at 7–8). Indeed, as Dr. Varian has explained, display ads lack the strong intent signal of a query and therefore must be targeted based upon other information, such as context or demographics. Tr. 427:21–428:24 (Varian (Google)) (discussing UPX0910 at -753); UPX0910 at -753 (Dr. Varian writing, "The vast majority of our profits come from search ads because the signal from the query is [so] strong." And lacking strong signals, publishers (i.e., sellers of display ads) "need to target based on context or demographics."); UPX0913 at -021 (Dr. Varian presentation listing ways to target display ads).

122. Like other display ads, social ads are targeted based on inferred intent from signals, such as groups in which a consumer has shown interest. Tr. 5238:3–5239:6 (Dijk (Booking.com)) (Booking.com uses Facebook ads to build awareness and consideration by targeting visitors of travel-focused groups.); Tr. 7386:10–7387:13 (Raghavan (Google)) (Social media targets ads using "latent intent" signals.); Des. Tr. 118:7–119:10 (James (Amazon) Dep.) ("[O]n Facebook the targeting is done in a different way. That is, it is more creating an ad which is really more focused around the graphic nature of the products and that it is determined by Facebook as to whether or not that ad is relevant for the user. But it is not driven by a query, per

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se."). Thus, on TikTok, users do not typically enter a search to view content but rather scroll through an algorithmic video feed created based upon a user's engagement with previous videos. Tr. 7419:9–7420:15 (Raghavan (Google)).

123. Traditional, display, and social ads are most suited and effective for goals associated with generating demand, e.g., increasing awareness and interest, which fall at the top and middle of the consumer purchase funnel. Tr. 5391:10–23, 5443:1–5444:15 (Jerath (Pls. Expert)) (discussing UPXD103 at 8, 19).

124. Display ads "are essentially an advertiser putting a message out there when a consumer isn't necessarily even looking for something." Tr. 5123:1–5424:1 (Booth (The Home Depot)) (specifically mentioning banner and social ads); Des. Tr. 149:18–19, 149:21–22 (Ramalingam (Yahoo) Dep.) ("[O]ne of the primary objectives" of display ads is to build brand awareness.); Des. Tr. 252:25–253:10 (van der Kooi (Microsoft) Dep.) (Display ad is generally used for "awareness-based advertising."). Thus, ad agency IPG views display ads as most effective in driving awareness. Tr. 3816:7–11, 3819:6–9 (Lowcock (IPG)).

125. Advertiser's views are consistent with IPG's view. The Home Depot uses display and social ads to nurture the consumer journey by presenting the consumer with multiple product and service options, with the goal of leading the consumer down the transaction path to where paid search focuses. Tr. 5122:1–20 (Booth (The Home Depot)). "If General Motors launches a new vehicle and they want to put that new vehicle in front of as many consumers as they can, they buy lots of display ads that are out on the Internet." Des. Tr. 254:1–4, 254:9–255:9 (van der Kooi (Microsoft) Dep.).

126. Similarly, Booking.com advertises on Facebook, Instagram, and TikTok to drive awareness and consideration. Tr. 5241:17–5243:17, 5279:21–5280:9 (Dijk (Booking.com)). And

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others in the advertising industry do the same. Tr. 5120:22–5121:25, 5168:4–25 (Booth (The Home Depot)) (The display and social teams focus "more on the upper funnel, where they're trying to inspire, they're trying to bring awareness, they're trying to kind of nurture that consumer path, to the point where they're eventually at a point where they want to make a transaction."); Tr. 6587:4–17 (Vallez (Skai)) (Skai views social ads being "more upper funnel . . . where we're trying to influence and engage [with consumers] when they're not necessarily in the context of purchasing."); UPX0445 at -507 (Facebook executive: "Our strength (core) is the top of the funnel."); UPX2114 at -761 (Facebook VP of Ads Engineering[4] in 2021: "[P]eople don't come to core FB products with intent (unlike search), from the beginning, we knew we were about demand generation, not demand fulfillment . . . ."); UPX0916 at -765 (Facebook Group Lead in 2016 explaining why travel advertisers spend more on Google than Facebook: "We don't have the lower funnel intent that Google delivers via search.").

127. Although traditional, display, or social ads can reach consumers in other parts of the funnel, they are not as well suited and effective for achieving those goals compared to top funnel goals of awareness and consideration. Tr. 5391:24–5392:2 (Jerath (Pls. Expert)). For example, IPG views display ads as "not effective at all stages of the funnel" and "not effective[]" at leading to purchases. Tr. 3929:18–3930:17 (Lowcock (IPG)); *id.* 3839:23–3840:2, 3933:11–13, 3980:5–3981:6. Similarly, none of JPMorgan's paid social ads in the last year was for acquisition. Tr. 4905:6–4906:25, 4915:25–4916:2 (Lim (JPMorgan)). Other industry participants have consistent views. Tr. 5241:17–5243:17 (Dijk (Booking.com)) (Booking.com advertises on Facebook, Instagram, and TikTok to drive awareness and consideration, but not to reach high-intent users.); Tr. 6513:1–24 (Hurst (Expedia)) (Goal of social ads is engagement because of

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[4] Des. Tr. 113:15–21 (Levy (Meta) Dep.) (identifying Ning Li's position).

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"intent and where someone is in a purchase decision . . . . [W]e would rarely know in a social channel if someone is trying to book travel right now.").

d) Advertisers Attach A Unique Value To Text Ads And Other Search Ads, Which Are Most Suited And Effective For Harvesting Demand

128. Advertisers use different types of advertising, or ad channels, for different purposes. Tr. 3814:19–3815:13 (Lowcock (IPG)) (explaining IPG training materials, UPX0926 at -684, "Orienting these campaigns with the customer journey is critical so that you can align all assets housed within the campaign to a common and consistent goal."); Tr. 5390:21–5391:9 (Jerath (Pls. Expert)) (discussing UPXD103 at 7, "advertisers really want to figure out and understand[,] . . . for meeting this particular goal of the campaign, which channel is most suited and most effective.").

129. Text Ads and other Search Ads have a *unique* value to advertisers, allowing them to target consumers' declared intent in real time and harvest demand for their products and services. Tr. 5443:1–5444:15 (Jerath (Pls. Expert)) (discussing UPXD103 at 19). Only Text Ads and other Search Ads are targeted based on consumer's declared intent, in real time. Tr. 5391:10–23 (Jerath (Pls. Expert)) (discussing UPXD103 at 8); Tr. 5220:9–22 (Booth (The Home Depot)) ("[S]earch ads are unique in the sense that somebody is going and initiating the action, going to Google, going to Bing, asking for solutions to -- asking for a solution."); Tr. 9076:6–17, 9077:5–14 (Fitzpatrick (Google)) (agreeing with Google's "search explainer" Danny Sullivan's statement, written in UPX1044 at -718, that "[t]he query itself—not any data about the user—is by far the most powerful signal for which results are most relevant and useful.").

130. Google recognizes the unique value of search and the differing purposes of other ad channels, and Google markets its own ad products accordingly. It identifies its search

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campaigns as "Google's best performing campaign, the first place you should spend and maximize budgets." UPX0451 at -956. Google's other products are similarly categorized: Performance Max Campaigns are a bundled product second in importance to Search Campaigns, Discovery Campaigns are "the best way to spend social budgets with Google," Video Action Campaigns are "the best way to spend performance video only budgets," and Google Display Ads Campaigns are "the best way to spend display only budgets with Google." *Id.*

131. As Tracy Lim, Managing Director and Chief Media Officer for JPMorgan Chase, explained, "[B]ecause we are not intercepting you whilst you're enjoying your TV show or whatever it is that you may be doing on another channel, you have come to Google or Bing as a consumer and typed in your query. We're responding to that query, which is unique to paid search." Tr. 4854:4–13 (Lim (JPMorgan)); Other industry participants have similar views. Tr. 5123:1–23 (Booth (The Home Depot)) (With "pull ads," i.e., paid search, the consumer "is actively looking for something," and The Home Depot has "the opportunity to be able to respond to that query" and "bring[] people in who are already in market."); Des. Tr. 254:1–4, 254:9–255:8 (van der Kooi (Microsoft) Dep.) ("Pull advertising is . . . a consumer pulls the ad by typing into the search engine 'electric vehicle from General Motors.' When they type that in and see a search ad for an electric -- for a Volt -- the Chevy Volt, then they pull the ad down by way of their query."); UPX8033 at .001 (Google Ads Help: "Create a Search campaign," listing benefits of Search Ads and including the ability to "[t]arget people actively searching for your specific products and services."); UPX1014 at -079 (Search Ads has the "ability to 'pull' users into a brand's message.").

132. Marketing platform Skai similarly expressed that "[t]here's no paid media channel that better captures the intent of users" than Search Ads. PSX01200 at 1 (Skai webpage noting

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the importance of Search Ads); Tr. 6585:25–6586:17 (Vallez (Skai)) (agreeing with statement in PSX01200 at 1).

133. Other industry participants likewise believe that Text Ads and other Search Ads are uniquely able to target consumer's real-time declared intent. UPX0450 at .006 (IPG highlighted for a client that "search reaches consumers at the moment of intent."); Des. Tr. 140:14–17, 140:19–141:14, 141:16–17 (Ramalingam (Yahoo) Dep.) (Search Ads' unique value proposition is that they have "higher purchase intent compared to any other form of advertising."); Des. Tr. 284:7–285:22 (Utter (Microsoft) Dep.) (The query has "strong and very unique intense signal" accessible by Search Ads.); Tr. 5241:2–11 (Dijk (Booking.com)) (agreeing with statements in ¶ 29 of Plaintiff's Amended Complaint (shown in DXD-03 at .006) that Search Ads enable advertisers to target potential customers at the exact moment users express interest in a topic.); UPX0026 at -764 (Dr. Varian's "Online advertising primer": "Search ads are an effective form of advertising since queries are a strong signal of user interest and intent and the ads appear immediately after the query is entered.").

134. Given their ability to target real-time declared intent, Text Ads and other Search Ads are most suited and effective for harvesting demand. Tr. 5391:10–23 (Jerath (Pls. Expert)) (discussing UPXD103 at 8). For example, Ms. Lim described Text Ads as "the only channel that [JPMorgan Chase] consider[s] . . . [a]s exclusively [a] demand channel" and further confirmed in responding to the Court that "within paid advertising, [paid search] is the biggest acquisition driving channel." Tr. 4841:2–12, 4853:1–6, 4854:22–4855:6 (Lim (JPMorgan)); UPX0441 at -801–02 (JPMorgan "paid search deep dive doc": "Search is a consumer demand driven media channel, through search queries it has the ability to answer people's questions with expansive coverage on 100Ks+ keywords. Search can drive acquisition based on some of the strongest

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intent signals made available." (emphasis omitted)). Similarly, Global Chief Media Officer Joshua Lowcock, at Interpublic Group's Universal McCann, explained that Text Ads are most effective at driving conversions. Tr. 3816:23–3817:1, 3826:11–3827:11, 3835:25–3836:10 (Lowcock (IPG)); *id.* 3836:15–3837:4 (Search Ads are not an "effective method to driving awareness," and they are highly cost ineffective for branding.); UPX0450 at .006–07 (IPG client presentation: "[P]aid search is operating in the lowest part of the funnel, capturing any demand driven from upper funnel activity . . . ." (emphasis omitted)).

135. Booking.com similarly purchases Search Ads to get "high-intent customers" who "have expressed a very clear interest in booking a hotel." Tr. 5236:19–5237:1 (Dijk (Booking.com)). Other industry participants likewise believe Search Ads are the best method to target user intent. Tr. 6586:18–6587:3 (Vallez (Skai)) ("[S]earch is more often than not the last step, one of the last steps in that [purchase] journey. . . . [S]earch again is more often than not that channel where they make their [purchase] decision."); Tr. 5120:22–5121:25 (Booth (The Home Depot)); Des. Tr. 45:4–46:16 (Alberts (Dentsu) Dep.) ("Search can be great way to capture demand that's at the bottom of the funnel."); Des. Tr. 108:2–109:9 (Raymond (Kohl's) Dep.) ("Oftentimes search is one of the . . . last places a customer will go."); Des. Tr. 121:18–122:2 (James (Amazon) Dep.) ("With respect to the search ads program, Text Ads and Shopping ads, intent is an important signal in terms of what that would lead to from a conversion perspective. A user who is searching for the Dyson DC65 vacuum is probably very interested in purchasing that specific model of vacuum. So, yes, it is an important signal in terms of the conversion probability.").

136. The different ways in which ads are priced reflect how different ad channels align with different goals. Indeed, display ads are typically priced per impression, corresponding to the

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goal of generating demand, but Text Ads and other Search Ads are priced on a click-basis, corresponding to the lower-funnel goal of harvesting demand. Tr. 5430:15–5431:5 (Jerath (Pls. Expert)).

137. Average ad click rates similarly reflect how different ad channels align with different goals. On average, an advertiser can expect consumers to click on their display ad in the range of only 1–10 times per 10,000 impressions. Tr. 1194:25–1195:13 (Dischler (Google)) (Display ads are sold on a cost per mille (CPM) basis, i.e., a cost per thousand impressions.); Tr. 5431:6–14 (Jerath (Pls. Expert)). By contrast, on average, an advertiser can expect consumers to click on their Text Ad in the range of 200–400 times per 10,000 impressions—which is as much as two orders of magnitude greater than for display ads. *Id*. 5431:15–5432:2.

3. Google's Search Ads Products And Their Development

138. Google offers up to seven ad "positions" for purchase on each of its mobile and desktop SERPs—four in the "top slot" (i.e., above the organic results) and three in the "bottom slot" (i.e., below the organic results). UPX0010 at -051–53. Each of the seven positions can house a single Text Ad, or a "carousel" of shopping ads can appear in one of the top slots. UPX0025 at -028 ("Shopping ads appear on top of organic search listings . . . ."); UPX0012 at .003–04 (illustrating desktop and mobile SERP and showing shopping ads in top slot on both); UPX6058 at -002 (Google Ads Help: "About ad position and Ad Rank": "Ad position is the order of your ad in the auction results compared to other ads."). Desktop SERPs also display shopping ads—but not Text Ads—along the right-hand side of the SERP. UPX0464 at -157 (illustrating desktop SERP with shopping ads); Tr. 4617:1–17 (Whinston (Pls. Expert)) (describing depictions of SERPs from google.com and amazon.com in UPXD102 at 10, depicting Google SERP with shopping ads on the lower right side).

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139. Not every search query on Google returns a Search Ad; rather, Google returns ads only for queries with "commercial intent." Commercial intent is something of a truism: a query has "commercial intent" if an advertiser is willing to advertise on it. Tr. 1171:3–21 (Dischler (Google)); *id.* 1171:23–1172:1; Tr. 398:13–15 (Varian (Google)) ("A commercial query is one that's related to business or commercial matters."); Tr. 3686:22–3687:8 (Ramaswamy (Neeva)) ("[C]ommercial intent covers queries that people are willing to pay money for.").

a) Auctions

140. For each search query, Google auctions off available ad space on its SERP. Google identifies ads targeting the query from millions of candidates; the targeting method varies by ad format. If any eligible ads exist, Google selects, ranks, and prices them using a variant of a second-price auction. Tr. 4011:16–23, 4015:17–22, 4240:21–4241:22 (Juda (Google)); Tr. 1199:25–1200:3 (Dischler (Google)); DX0153 at -092. Google separately auctions off each ad position on the page, first auctioning off the top position, then retrieving a new set of candidates and running a new auction for the second position, and so on. DX0153 at -092; UPX0010 at -064–66 (Google regulatory submission explaining the auction). Moreover, Google maintains wholly separate auction stacks for Text Ads and other Search Ads, meaning Text Ads are not auctioned against PLAs, nor vice versa. Tr. 4018:24–4019:3, 4019:10–18 (Juda (Google)); Tr. 1197:9–13 (Dischler (Google)); Tr. 3812:9–15 (Lowcock (IPG)); UPX6032 at -654–55 (Google admission (Resp. 11) that it has different auctions for shopping ads and for Text Ads). Thus, a single query can trigger multiple Google-run auctions.

141. In a classic second price auction, the highest bidder wins but pays a price equal to or slightly above the first runner-up's bid, making the runner up's bid critical to the ultimate price paid by the winner. Tr. 1200:4–25 (Dischler (Google)). Google calls its variant a "Generalized Second Price Auction." Tr. 4015:17–22 (Juda (Google)); DX0153 at -092.

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142. Instead of ranking and pricing by bid, for each ad Google calculates an LTV (long-term value) score—referred to externally as Ad Rank—using the advertiser's bid and several Google-calculated assessments of the quality of the ad. DX0153 at -092; UPX8030 at .001 (Google Ads Help on Ad Rank); UPX0010 at -054–57 (overview of LTV and Ad Rank). Google then ranks and prices the ads in each position by LTV/Ad Rank. DX0153 at -092; UPX8030 at .001 (Google Ads Help on Ad Rank); UPX0010 at -054–57 (explains iterative pricing and ranking process).

143. Google's design and control of the auction, coupled with the auction's reliance on internal calculations, gives Google the ability to affect the auction's outcome, including the price ultimately paid by advertisers. Indeed, and as conceded by Dr. Varian, a monopolist selling through an auction process has multiple levers through which it can affect the outcome. Tr. 465:9–12 (Varian (Google)). Google uses these levers to conduct "intentional pricing," which it defines as changing the auction's design to change prices. UPX0509 at -869; Tr. 4102:18–4103:2 (Juda (Google)) (Google can directly change how the auction works, impacting pricing.). *Infra* ¶¶ 629–637 (§ V.C.5.a).

b) Launches

144. Google internally refers to changes to its Search Ads business—i.e., changes in the appearance of the SERP or Search Ads themselves (including Text Ads) or changes to the various Search Ads auctions—as "launches." Des. Tr. 15:6–11 (Miller (Google) Dep.); Tr. 1205:19–25 (Dischler (Google)). For each change, Google creates and maintains documents, known as "Launch Docs," reflecting the launch details. Des. Tr. 159:4–20 (Jain (Google) Dep.) (discussing UPX0746 (dep. ex. 9), a launch doc for the Holy Load launch).

145. Google's ad launch process uses live Google traffic to assess a launch's impact on Google's revenue and user metrics. Des. Tr. 15:12–13, 15:15–24, 16:2–14, 16:20–17:6

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(Miller (Google) Dep.). This includes an escalating series of experiments, which start with simulations or A/B tests conducted on very low levels of live traffic. *Id.*; Tr. 4271:22–4272:15 (Juda (Google)); Tr. 2315:15–2316:9 (Giannandrea (Apple)) (Google did not "typically" make a change to its algorithm without a live A/B experiment (testifying about his time at Google)); Des. Tr. 92:3–12 (Jain (Google) Dep.). Assuming a positive outcome, the live experiments will be expanded to include larger levels of traffic, eventually reaching 10% of traffic, at which point more senior "launch approvers" need to sign off on the experiment. Tr. 4271:22–4272:15 (Juda (Google)). Assuming continuing good performance, the experiments will be expanded further, including at least a step involving 50% of traffic, before finally going to all traffic. *Id.* Although Google also attempts to conduct post-launch analysis of effects, it believes its pre-launch process more accurately measures the effect of a change because of "noise in the system" after a full launch. Des. Tr. 15:12–13, 15:15–24 (Miller (Google) Dep.).

D. Search Access Points

1. A Search Access Point Is Where A Desktop Or Mobile-Device User Can Enter A Query

146. A search access point is any place on a device where a user enters a search query. Tr. 323:11–19 (Barton (Google)); Des. Tr. 44:5–8 (Google-NF 30(b)(6) Dep.); Tr. 1027:23–25 (Higgins (Verizon)) (search entry points are "different mechanisms for you to access search on the device").

2. Search Access Points On Desktop

147. Desktop browsers allow users to view websites, including GSEs. Tr. 7642:13–17 (Pichai (Google)) (in 2004, browser users could "navigate to Yahoo.com or Google.com or whatever your choice was"). Desktop browsers direct queries entered into the address bar to a GSE. Des. Tr. 211:16–212:5 (Google-RG2 30(b)(6) Dep.) (queries entered into a browser's

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address bar are conducting "default search"); Tr. 700:12–701:2 (Rangel (Pls. Expert)) (discussing DXD-01 at .001–04 and showing general search being conducted from an address bar in Safari on desktop). In the past, toolbars, or plug-ins for different browsers, were another method by which consumers could access GSEs (and by which Google could track general search market share). Tr. 7642:2–12 (Pichai (Google)) ("Google Toolbar was a way by which, in those days in browsers, you could add an extension . . . a search box . . . it provided users a convenient way to search Google"); Tr. 201:2–6 (Varian (Google)). The advent of built-in search boxes on browsers rendered downloadable tool bars obsolete. Tr. 7676:16–7677:19 (Pichai (Google)) (toolbar was developed when there was no built-in browser search box); Tr. 201:4–8 (Varian (Google)) (toolbars are "no longer popular").

3. Search Access Points On Mobile

148. The number of search access points on mobile has grown over time. Des. Tr. 71:8–19, 72:4–20 (Ezell (AT&T) Dep.) (search access points include search widgets, browser search, and voice search); Tr. 3714:3–11 (Nadella (Microsoft)) ("search access point[s]" are "the places where people get to a search engine" and have "changed over time and have multiplied"); UPX0581 at -625.

149. Market participants have developed a lexicon to describe the geography of mobile devices and places where app icons and widgets, including ones containing search access points, can be placed. Des. Tr. 65:19–68:15 (Ezell (AT&T) Dep.) (describing terms such as the hot seat, minus one screen, plus one and plus two screens, and application tray). The default home screen is the screen users sees after unlocking a mobile device or pressing the home button. Tr. 790:22–791:2, 805:25–806:2 (Kolotouros (Google)). The plus one screen refers to the screen to the right of the default home screen, i.e., the screen a user navigates to by swiping from right to left from the default home screen. *Id.* 947:23–948:8. The minus one screen refers to the screen to the left

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of the default home screen, i.e., the screen a user navigates to by swiping from left to right from the default home screen. Tr. 3123:1–12 (Tinter (Microsoft)); Des. Tr. 42:2–17 (Giard (T-Mobile) Dep.).

150. The hot seat or application dock on a mobile device refers to the bottom row of apps that a user can access quickly and that persist when swiping to the right or left. Tr. 923:8–23 (Kolotorous (Google)).

a) Mobile Browsers

151. Mobile browsers are preinstalled on virtually all mobile devices distributed in the United States. Tr. 1518:17–19 (Yoo (Google)) (MADA requires Chrome to be pre-loaded on the device); Tr. 2454:11–16 (Cue) (Apple)) (Safari browser is preloaded onto Apple devices).

152. Mobile browsers contain preinstalled search access points (e.g., address bar, default homepage) set to default GSEs. Tr. 1518:17–21 (Yoo (Google)) (MADA requires Chrome with Google set as the default search engine); Tr. 795:15–17 (Kolotouros (Google)) (address bar on Chrome is a search access point); Tr. 1028:1–3 (Higgins (Verizon)) (a search bar in a browser is a search entry point).

b) Search Apps

153. Search apps are applications that allow users to conduct searches and direct queries to a preset GSE. Tr.797:25–798:11 (Kolotouros (Google)) (the Google Search app directs a search query to Google through the same process as searching through Chrome.); Des. Tr. 55:16–19 (Ribas (Microsoft) Dep.) (Bing search app links to searches on Bing); Des. Tr. 142:20–25 (van der Kooi (Microsoft) Dep.) (a search app is an entry point that “can either be downloaded or that is the default on a third-party platform”). Search apps are search access points that can be preinstalled on a smartphone or other device. Tr. 323:11–19 (Barton (Google)) (The Google search app is one access point). The preset GSE in a search app generally cannot be

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changed by the user. Tr. 6066:17–21 (Whinston (Pls. Expert)) (a search widget is a manifestation of a search engine application with a convenient search entry box); Tr. 833:11–16 (Kolotouros (Google)) (the widget can be removed but the search itself cannot be changed).

154. The Google Search App—with Google set as the default GSE—is preinstalled on virtually all Android devices distributed in the United States. Tr. 1518:12–16 (Yoo (Google)) (MADA requires the Google search app to be preinstalled on the device); UPX0129 at -905 (MADA requires preinstallation of the Google search app).

c) Search Widgets

155. Widgets are self-contained code that display a program, or a piece of a program, that is a shortcut to an application. Tr. 1029:6–12 (Higgins (Verizon)) (a search widget is "a small piece of software that sits on your device that allows access to search capability."). Search widgets are search access points, directing queries to a preset GSE. Tr. 794:3–5, 795:8–14 (Kolotouros (Google)) (Google search widget is a search access point that must be set to Google search); Des. Tr. 98:1–10 (Christensen (Motorola) Dep.) (a search widget is "a common way to search" and home screen placement enhances accessibility of the widget); Tr. 559:9–13 (Rangel (Pls. Expert)) (the search widget "allows consumers to type a search there without having to open a browser; a search app and, by default, searches with Google"); Des. Tr. 143:2–23 (van der Kooi (Microsoft) Dep.) (the search default/search box is "already on the device and is staring you in the face"). The Google Search Widget is a visual representation of the Google search app in which users can enter queries. Tr. 791:3–7, 794:3–9 (Kolotouros (Google)) (explaining that the Google Search Widget is part of the GSA and that it is a search box users can enter questions in). The Google Search Widget is sometimes referred to as the QSB or quick search box. Tr. 796:16–19 (Kolotouros (Google)).

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156. Google's search widget is preinstalled across the home screen of all Android devices distributed in the United States. Tr. 18:1–4 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (the widget is part of the Google search app, which the MADA requires to be on the device); Tr. 815:9–22 (Kolotouros (Google)) (Google had not granted, any waivers, which would allow manufacturers to remove the widget from the home screen); Tr. 815:16–816:1 (Kolotouros (Google)) (not aware of any Samsung or Motorola device without a pre-installed Google Search Widget); Tr. 792:25–793:23 (Kolotouros (Google)) (discussing JX0049 and confirming that all MADAs require Google Search Widget placement on the default home screen). Tr. 3125:10–3125:22 (Tinter (Microsoft)) (against Microsoft's preference, Google widget appears on the home screen of the Microsoft Duo, a dual-screen Android smartphone); Des. Tr. 45:6–11 (Christensen (Motorola) Dep.) (all Motorola devices ship with the Google Search Widget on the default home screen).

157. Neither Android users nor Google's counterparties like the search widget on the device's home screen. UPX0128 at -546–47 (2016 Lockheimer (Google) email to Google chief business officer informing him that "[w]e've done UX research" confirming that "[u]sers generally are tired (visually) of our widget" and "OEMs are VERY tired (visually) of our widget . . . they feel like they don't get to differentiate").

4. Other Search Access Points

158. Other search access points, such as voice assistants and smart keyboards, have miniscule search volume. Tr. 3107:3–3108:19 (Tinter (Microsoft)) (Apple hoped to encourage use of the voice assistant and voice entry point but "in practice, that thesis did not play out as…there was not a significant user behavior shift" from searching in the browser to using Siri and Spotlight).

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E. Scale Is Vital For General Search Engines

159. "Scale" refers to the amount of user-side data a search engine can accumulate. Tr. 3695:6–3696:10 (Ramaswamy (Neeva)) ("[S]cale here refers to how much query click information is one able to collect."). User-side data is a term that includes many types of data GSEs can obtain from users—including a query and its ranked results—who interact or engage with their search engines. UPX0262 at -989 ("User interaction signals include clicks as well as all other interactions from users with search results or search result pages, which can be mined from session logs."); UPX0212 at -122 ("To work around our inability to understand documents, we observe and recall human reactions to those documents. The form of reaction we rely upon most heavily in web ranking is clicks on search results.") The most basic and important interaction is a click—such as when a user clicks on a link. Tr. 2650:25–2651:7 (Parakhin (Microsoft)). GSEs track many types of user-side data, including when a user reads, pays attention to, scrolls, or hovers on a result. Tr. 1767:21–1771:14 (Lehman (Google)) (discussing UPX0004); Tr. 2255:9–18 (Giannandrea (Apple)).

160. GSEs track the nuances of these interactions. For example, GSEs track how much time users spend on a page after clicking, how quickly users click back, whether users scroll down, or even which results the users *didn't* click on. Tr. 2650:25–2651:7 (Parakhin (Microsoft)); *id*. 2651:8–2652:1 (abandoning a SERP is an example of user-side data showing a bad result); Tr. 1767:21–1771:22 (Lehman (Google)) (discussing UPX0004 at .004).

161. GSEs also track other important information about the user. For example, the time of day a search was issued, where it was issued from, and the device type used. Tr. 2256:11–2257:10 (Giannandrea (Apple)) (location and time of day are also useful search signals); Tr. 2661:17–20 (Parakhin (Microsoft)) (Microsoft tracks search traffic by device type or form

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factor); Tr. 6416:24–6417:4 (Nayak (Google)) (Google tracks what type of device from which each query is issued).

162. Users interact with Google billions of times a day, and Google logs this user data. Tr. 1761:16–21 (Lehman (Google)) (discussing UPX0228 at -503); UPX0870 at .016 ("[Google] logs data about every search result that appears on the SRP."). In fact, Google retains anonymized user-side data indefinitely. Tr. 6395:19–6396:9 (Nayak (Google)) (stating that "to the extent that it is anonymized and de-identified," Google will "keep it" and did not know Google "would delete it").

1. Scale Enables General Search Engines To Return Better Results

163. Scale is vital for improving many aspects of search, including both quality and revenue. Tr. 2644:13–14 (Parakhin (Microsoft)) (explaining that scale "affects greatly many aspects of both quality and revenue"); *id*. 2644:20–2646:2 (explaining that more scale results in more clicks and more user behavior, which will "very directly influence search quality," and causes websites to "optimize for the most popular search engine," ultimately providing "better results"). Google initially held the opinion that scale was integral to search. Tr. 238:12–239:5 (Varian (Google)) (in one year Dr. Varian went from saying data is integral to scale is bogus).

164. The more search queries a GSE sees, "the better search quality you're going to have by definition." Tr. 3496:12–16 (Nadella (Microsoft)); Des. Tr. 225:6–13 (Ribas (Microsoft) Dep.) ("In this business, data is everything . . . . [S]cale is so critical. And so every additional data that we can get . . . . It's really going to be helpful for us to improve the quality of our results."). The value of user-side data continues to accrue beyond the point of diminishing returns. Tr. 10078:3–12 (Murphy (Def. Expert)) ("[T]here's pretty much always diminishing returns, but that doesn't mean they're not valuable even after some diminishing returns have set in."); Tr. 6637:6–6338:6 (Nayak (Google)) (acknowledging that Google deploys user-side data

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beyond the point of diminishing returns so long as its value outweighs the cost); Tr. 10349:15–10351:7 (Oard (Pls. Expert)) (Google values user-side data beyond its competitor's shares because, despite the costs, Google deploys 13 months' worth of user-side to train its algorithms.). The amount of data a GSE has affects where that search engine is on the diminishing returns curve; GSEs with less data receive higher returns to additional data than GSEs with more data. Tr. 10346:23–10350:7 (Oard (Pls. Expert)) ("[W]hen you have very little [data], then not only do you get better, but you keep getting better at a faster and faster rate . . . .").

165. Google deploys user-side data throughout its systems. Tr. 1789:4–16 (Lehman (Google)) ("Not one system but a great many within ranking are built on logs. This isn't just traditional systems . . . but also the most cutting-edge machine learning systems.") (quoting UPX0219 at -426); Tr. 1762:23–1763:3 (Lehman (Google)) ("[F]or whatever volume of data we have . . . we make copies of it, and each copy . . . goes to a different ranking component."). Crawling, indexing, retrieval, query refinement, web ranking, search features, and wholepage ranking are all improved through scale, allowing Google to return better search results. *Infra* ¶¶ 167–195 (§§ III.E.1.a–g).

166. Google concedes that scale gives Google a "competitive advantage" and that scale is the "magic" behind Google's success. UPX0203 at -906 ("We look at people. If a document gets a positive reaction, we figure it is good. If the reaction is negative, it is probably bad. Grossly simplified, this is the source of Google's magic."); UPX0228 at -501 ("[M]ost of the knowledge that powers Google, that makes it magical, originates in the minds of users. Users are the founts of knowledge--not us."); *id.* at -503 ("After a few hundred billion rounds we start lookin' pretty smart! This isn't the only way we learn, but the most effective."); UPX0189 at -218 ("But *sessions logs* are our unique competitive advantage."); Tr. 2313:24–2315:11

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(Giannandrea (Apple)) (stating that when he was head of Google Search he was "very much" against sharing click data with Apple because it was Google's "secret sauce") (discussing UPX0235 at -391).

a) Crawling Benefits From User-Side Data

167. Crawling benefits from user-side data. The order and frequency in which a GSE crawls the web is "one of the most important problems" in building a GSE, and user data helps determine which places to crawl more or less frequently. Tr. 2207:1–9 (Giannandrea (Apple)). Crawling websites creates a cost to the websites' owners. Tr. 2656:19–2658:24 (Parakhin (Microsoft)). Because of these costs, website owners give search engines with greater scale more latitude to crawl their sites since websites will get a higher return in the form of traffic. Tr. 2656:19–2658:24 (Parakhin (Microsoft)). Similarly, websites will optimize to allow crawling by search engines with greater scale. *Id*. 2656:19–2658:24. For smaller search engines, the crawling costs to the website owners outweigh the benefits, so the website owners often prohibit such crawling. *Id*. 2656:19–2658:24.

b) Indexing Benefits From User-Side Data

168. Indexing benefits from user-side data. Tr. 2210:22–2211:4 (Giannandrea (Apple)). User-side data enables a GSE to know which pages must continue to be maintained in the index. Tr. 6310:6–20 (Nayak (Google)). Also, for efficiency, an index must be broken up into smaller pieces and organized in tiers based on the likelihood the information will be retrieved. UPX0870 at .013 ("[W]e actually divide the index into several smaller indexes called **tiers**. Each page is assigned to a tier based on how fresh it needs to be and the fresher tiers are built more frequently." (emphasis in original)). User-side data is used by GSEs to determine how to best organize their indexes. Tr. 2211:2–17 (Giannandrea (Apple)) (knowing which queries are popular is an important part of indexing "[b]ecause you would want to make sure that you had

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covered queries that you see frequently."); Tr. 10274:3–10275:13 (Oard (Pls. Expert)) (Google deploys user-side data to improve its index).

c) Query Understanding And Refinement

169. To return relevant results, GSEs begin by attempting to understand the user's query and its intent. UPX0213 at -715 ("Understanding the search query is a preliminary step in ranking."); UPX0870 at .004 ("[W]e do our best to determine the possible intents of the query and use that to break the query into multiple forms that get passed to different systems, depending on that intention, for further processing."); UPX0194 at -556 ("Understanding the meaning of a query is crucial to returning good answers.").

170. Query understanding includes refining the issued query to match its intent. UPX0870 at .016 ("If we sent the raw query…to the Search servers and did a keyword search of the index, we would come up with some search results, but they might not match the user's intent."); UPX0194 at -556–57 (Google uses signals to "identify user intent and match it to relevant documents"). Among the important aspects of query understanding and refinement is correcting for spelling errors or word choices (i.e., adding synonyms). UPX0870 at .016–17.

171. Spelling and synonym systems used for query understanding and refinement have a significant effect on search quality. UPX0196 at -158 ("Spelling errors in search queries are very common, so correction is vital."); UPX0194 at -556 ("Our testing shows that understanding synonyms significantly improves results in over 30% of searches . . . ."); UPX0870 at .016 ("Sometimes including synonyms for a query term in a keyword search improves results.").

172. Google relies heavily on user-side data to improve its various synonym and spelling-based systems. Tr. 8088:21–24 (Gomes (Google)) (Google has benefited from and continues to benefit from user data to improve spelling correction, auto-complete, and synonym matching); Tr. 2272:10–2273:10 (Giannandrea (Apple)) (between 2010 and 2018, one of the

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ways that Google became better at spelling was through user engagement); UPX0184 at -912 ("The key issue here as I see it is that you do get better as you have more users -- that's why we have the best spell check, the best personalized search, the best refinements, etc."); Tr. 227:13–228:11 (Varian (Google)) (explaining that "[t]he Google spell checker is based on our analysis of user searches compiled from our logs -- not a dictionary," discussing UPX0862 at -707).

173. For example, Google autocomplete and "Did you mean?" systems rely on user-side data to help users formulate a query or suggest a replacement for a misspecified query. UPX0224 at -914 ("1 in 10 search queries are misspelled - but it doesn't matter, because our "Did you mean" feature is there to help. We've been building this spelling technology for 18 years. How? By looking for mistakes. We look at all the ways in which people mis-spell words in queries and text all over the web, and use that to predict what you actually mean."); UPX0857 at -015 (autocomplete predicted queries are determined based on objective factors, including popularity of search terms; the data is updated frequently to offer fresh and rising search queries); UPX0863 at -531, -553 (Google's system for suppressing or promoting spelling suggestions is "[t]rained on user clicks for queries with suggestions from session logs").

174. By helping users better articulate their needs, these systems help Google return more relevant results and thus improve their search quality. UPX0870 at .016 ("If we sent the raw query. . . to the Search servers and did a keyword search of the index, we would come up with some search results, but they might not match the user's intent. . . . Using just keywords . . . you will lose some of the intent the user originally had when they entered the query"); UPX0194 at -556–57 ("Understanding the meaning of a query . . . involves more than just finding the pages that contain the keywords in your query."); *id.* at -556 (Google's synonym system "helps bridge the gap between query and document vocabulary.").

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d) Retrieval Benefits From User-Side Data

175. Retrieval is a preliminary stage of scoring documents that may be responsive to a user query. UPX0213 at -729. Ideally, the retrieval process will not gather all the responsive documents but will gather all the best documents from the index. *Id.*; Tr. 6330:25–6332.11 (Nayak (Google)) ("A typical query might have millions of documents on the web that match it, but there's no way that in the fraction of a second that we need to do all this in we can look at a million or millions of documents and retrieve them. So instead, what we do is we have a retrieval process that gets us of the order of tens of thousands of documents from the index that you can actually look at.").

176. One important system Google uses for retrieval is a deep-learning system, called RankEmbedBERT. Tr. 6451:4–6 (Nayak (Google)). On top of traditional retrieval systems, RankEmbedBERT retrieves a few more documents to be scored in the ranking phase. *Id*. 6451:4–6. Google trains RankEmbedBERT on click and query data. *Id*. 6448:20–25; UPX0868 at -610 ("We train [RankEmbedBERT] on [redacted] queries, randomly sampled from [redacted] of Qsessions.").

e) Web Ranking Benefits From User-Side Data

177. Web ranking is the process of determining which web results provide the most useful responses for a query and organizing them in order of usefulness. UPX0870 at .002 ("At a high level, Search consists of two fundamental stages: 1. Organizing information from webpages into a search index. 2. Serving query results by sorting through the search index and finding the most relevant, useful results.").

178. Obtaining user-side data at scale is critical to a GSE's ability to improve its web ranking. Tr. 1801:21–1802:6 (Lehman (Google)) (acknowledging authorship and agreeing with "Exploiting user feedback, principally clicks, has been the major theme of ranking work for the

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past decade." (quoting UPX0213 at -723)); *id.* 1777:15–1778:4 ("[W]hen thinking about . . . the value of the search results for a query, relevance is the most important consideration," and "having user data is useful to Google in identifying relevant results for a search query."); Tr. 3695:6–3696:10 (Ramaswamy (Neeva)) ("[O]ne of the biggest signals that all search engines have relied on for the past 20 years is this thing that you talk about, which is query click information"); Tr. 2271:3–8 (Giannandrea (Apple)) (agreeing that "engagement signals" are the "most powerful signals"); UPX0226 at -483 ("Learning from this user feedback is perhaps the central way that web ranking has improved for 15 years.").

179. GSEs derive patterns from user-side data to gauge user satisfaction and improve the ranking of their search results. Tr. 2652:2–14 (Parakhin (Microsoft)) ("The more data of this nature we have, the more we can train algorithms to be better in predicting what is good and what is bad."); Tr. 8090:24–8091:2 (Gomes (Google)) (agreeing that clicks are useful for understanding user needs and evaluating search results); UPX0005 at -806 ("All of these [user interactions] help [Google] understand user preference, user information consumption patterns, query intent, and more.").

180. For example, if a user clicks on a lower-level result, that provides a "signal" to a GSE that, next time, the result should be moved up in the SERP. UPX0266 at -984 ("If you show the right answer at position @3 and people click on it more than @1 then you know that you should be ranking it right and you can learn from this."); UPX0228 at -514 ("A click at 1 is a pat on the back. A click at 8 tells us how to improve."); UPX0225 at -285 ("If the document gets a positive reaction, we figure it is good. If the reaction is negative, it is probably bad. We understand documents by proxy."); UPX0228 at -502 ("As people interact with search, their actions teach us about the world. For example, a click might tell us that an image was better than

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a web result. Or a long look might mean a KP [knowledge panel] was interesting. We log these actions, and then scoring teams extract both narrow and general patterns."); UPX0196 at -175 ("One can regard each [SERP] as a massive multiple-choice test. Each day, we get to ask humanity a billion questions of the form, 'Which of these 10 documents is most relevant to your query?'").

i. Google Deploys User-Side Data At Scale To Train Traditional Systems That Improve Its Web Ranking

181. Google uses traditional ranking systems to narrow the document set that the search engine retrieves from its index. Tr. 6399:10–22 (Nayak (Google)) (Google uses "core algorithms" or traditional ranking systems to sift the documents down from tens of thousands to several hundred and score the documents); Des. Tr. 64:24–65:14 (Google-PN 30(b)(6) Dep.) (Once a user puts in a query, the core ranking algorithm identifies a subset of results that might be relevant); UPX0192 at -770 ("[C]lick prediction now underlies many scoring systems: navboost . . . rankbrain . . . QBST . . . .").

182. Generally, for Google search, traditional systems that count and tabulate results are "by far the most impactful techniques in web ranking." UPX0191 at -184. Two examples of important traditional systems that are used in ranking are Navboost and Query-Based Salient Terms (QBST). *Id.*; Tr. 1837:22–1839:4 (Lehman (Google)) (Navboost and QBST are memorization systems that have "become very good at memorizing little facts about the world"); *id.* 1806:2–15 ("Navboost records clicks on search results for queries. . . ."); UPX0196 at -175 ("Originally, Navboost was almost a pure memorization system; that is, it remembered that document D got a click for query Q. Based on this, we would show document D to the next person who issued query Q. Over time, Navboost has acquired some cross-query generalization; that is, we conclude that document D is also relevant for some related queries Q', Q'', etc.").

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183. NavBoost is one of the most, if not the most, impactful systems on Google's search quality. Tr. 2214:22–2215:4 (Giannandrea (Apple)) (Navboost is a "very important" at Google); UPX0197 at -214 ("I'm pretty sure that NavBoost alone was/is more positive on clicks (and likely even on precision/utility metrics) by itself than the rest of ranking."); UPX0190 at -740 ("Navboost remains one of the most power ranking components historically . . . ."); UPX0196 at -175 ("Navboost is the original click exploitation system and still the most potent."). QBST also has a substantial effect on Google's search quality. UPX0887 at -110 ("As a ranking signal, [QBST] is one of the most positive components of Web Search in identifying relevant docs for queries."); Tr. 1808:11–13 (Lehman (Google)) (confirming that "QBST helps identify relevant documents to respond to queries"); *id*. 1837:22–1839:4 (Navboost and QBST are memorization systems that have "become very good at memorizing little facts about the world").

184. Traditional ranking systems such as Navboost and QBST are trained on enormous amounts of user-side data. Tr. 6405:15–22 (Nayak (Google)) (Navboost memorizes all clicks that have been issued for all queries received in the last 13 months); Tr. 1805:6–13 (Lehman (Google)); UPX1007 at -371 (showing that QBST "[a]ggregate[s] the data over 13 months"); Tr. 1757:25–1758:3 (Lehman (Google)) ("Some of the systems that Google uses in ranking search results are machine learning systems that train on user data.").

ii. Google Deploys User-Side Data To Train Deep-Learning Systems That Improve Web Ranking

185. Google uses newer "deep-learning" ranking systems to fine-tune the search ranking. Tr. 6399:23–25 (Nayak (Google)). The primary deep-learning systems Google uses in ranking are RankBrain and DeepRank. UPX0255 at .010.

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186. RankBrain and DeepRank are trained on user-side data. Tr. 6433:9–13 (Nayak (Google)); UPX0255 at .010–.011 (showing that DeepRank uses on the order of [redacted] training examples); UPX0003 at -762 ("RankBrain . . . [t]rained on [redacted] of pairwise click preferences of titles and documents."). Like traditional ranking systems, deep-learning systems derive patterns from user-side data to deliver better results. UPX0213 at -724 ("RankBrain uses deep learning to extract and exploit patterns in click data."); UPX0237 at -879–80 ("Here is how RankBrain works at a high level. First you gotta train it: You go through search logs and effectively make a giant stack of index cards. Each card lists a user query and two search results-- but just TITLES and URLs, nothing else. The search result that got a user click gets a check mark. Then you hand Brain a [redacted] of these index cards, and it thinks things over for about a week. . . . Then RankBrain is ready to go! You can show it a query and two results (again, just the title and URL), and RankBrain figures out which result a user would prefer. Then you can rank a whole set of search results by aggregating a bunch of these pairwise preferences.").

187. Although deep-learning systems can be trained on data available from the open web (open data) or data obtained from paid human evaluators (human rater data), those systems would not perform as well as deep-learning systems trained on user-side data. Tr. 2762:23–2763:24 (Parakhin (Microsoft)) (As compared to training on open data "[T]raining using data -- user interaction data is one of the most powerful things, and that's what we observe consistently."); UPX0197 at -214 ("BERT itself performs much better when trained on web-answers specific data, compared to public data (wikipedia & co).").

188. Google's deep-learning systems such as RankBrain, and DeepRank do not replace traditional systems in web ranking; instead they are complementary to traditional systems.

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Tr. 6440:13–18 (Nayak (Google)) ("[BERT] does not subsume big memorization systems, navboost, QBST, etc." (discussing UPX0860)); *id.* 6430:18–22 (classifying traditional systems and machine learning systems as "additive"); UPX0256 at -188 ("And again, DeepRank doesn't replace the prod ranking. Instead, it is ensemble with the other signals we use in Web Ranking."); UPX0191 at -222 ("RankBrain, which is the foremost ML system in search, is still only one ranking component among many."); *id.* at -223 ("NavBoost (a glorified counting-based system for memorizing clicks) is still by far the most important component in search.").

189. In many important aspects, like fresh and longtail queries, traditional systems still outperform deep-learning models. UPX0255 at .014 ("Can we scale up ML models to be better than NavBoost? . . . [A]s far as I can tell none of these deep-learning models are as powerful as NavBoost. To some degree, this is not surprising. The Navboost Glue data is close to [redacted] in size. In contrast, models like RankBrain and RankEmbed are [redacted] in size, with DeepRank and RankBERT being significantly smaller. This likely makes it hard for the models to learn or memorize truly long-tail information on relevance or user preferences."). Traditional ranking systems such as Navboost are also better at handling fresh (where the responses may have recently changed) and popular queries (where many duplicate queries are seen). UPX0256 at -185 ("RankBrain could not be refreshed fast enough, compared to simple counting pipelines like Instant NavBoost. That means, for very fresh and popular queries, NavBoost would predict things better, and so we'd back-off from RankBrain to NavBoost in those cases."); UPX0214 at -696 (identifying "freshness" as one of several areas in which "deep models are making limited or no inroads" and stating that for freshness "[v]ery fast counting systems like instant navboost beat learning approaches").

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190. Further, as deep-learning models grow in size and capability, so does their computational cost. UPX2029 at -075 ("Training is also more computationally expensive, forcing us to use 100–1000x less training data than RankBrain.").

f) Search Features Benefit From User-Side Data

191. Search features are an important part of providing responsive results to a query. Tr. 1788:18–21 (Lehman (Google)) ("[W]eb ranking is only a part of search. . . ." (quoting UPX0219 at -426)); UPX1114 at -168 ("Small fraction of SERP is web results for many queries"). Many search features benefit from user-side data, including image and local search. UPX0219 at -426 ("[M]any search features use web results to understand what a query is about and trigger accordingly.").

192. Like user interactions with web results, user interactions with search features allow GSEs to derive patterns in the data to improve their search feature results. UPX0251 at -882 ("Image search implicitly poses a . . . multiple-choice question -- which do you like best? Thumbnails inform the user response, the users answer is logged as a hover, click, and click-thru."); UPX0862 at -707 ("[W]e've had a lot of success in using query data to improve our information about geographic locations, enabling us to provide better local search."); Tr. 228:12–19 (Varian (Google)) (query data improves local service by providing more information about geographic locations (discussing UPX0862 at -707)).

g) Wholepage Ranking (Ranking Of Web Results And Search Features) Substantially Benefits From User-Side Data

193. Wholepage ranking refers to the organization of the entire search results page beyond web results or "ten blue links." UPX0213 at -727. A SERP contains many components: web results, maps, answers, news blocks, knowledge cards, and much more. Wholepage ranking defines how Google arranges these various components into a single page. UPX0213 at -727;

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UPX0196 at -179. Wholepage ranking benefits from user-side data. Tr. 2307:13–22 (Giannandrea (Apple)) (stating that scale is "relevant" for determining what search features to "prioritize" on a search engine results page).

i. Google Deploys User-Side Data To Train Systems Used To Rank Whole Page Results

194. Google uses a system called Tangram (formerly, Tetris) to rank and then organize whole page results. Tr. 6408:8–18 (Nayak (Google)); UPX0004 at .059 ("Tetris: Goals: Rank all results using common signals for globally optimal ranking, common place to balance IS, recall and precision"); *id.* at 060 (Tetris "[o]ptimally rank[s] web and non-web results using a common set of signals"); UPX0003 at -763 (illustrating that Tetris is used to score "everything on the page" including Web Answers, Video Universal, Image Universal, and web documents). Tetris/Tangram have a substantial impact on search quality. UPX0190 at -740 ("**Tetris** definitely helped a lot here by ranking all the features on the page better, even though we don't have a measurement on the cumulative IS impact for Tetris alone." (emphasis in original)); UPX1120 at -517 (">95% of all results go through Tetris").

195. A critical input to Tetris/Tangram is a system called "Glue." Tr. 6408:8–18 (Nayak (Google)) (Glue is a signal within Tetris/Tangram that triggers search features in the results alongside the web result); UPX0262 at -989 (Glue "is one of the critical signals in Tetris"). Glue records all forms of user interactions (beyond just clicks) on all results (beyond web results) over a 13-month period. Tr. 1806:2–15 (Lehman (Google)) ("[T]here are other types of interactions with a search page, and there are other things on a search page besides just web search results. . . . Glue attempts to record all those other interaction types on all those other elements of the search page for different queries."); UPX0004 at .006 (The Glue pipeline "capture[s] user-interactions"); UPX0005 at -811 (showing Glue cache is 13 months). The user

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interactions Glue records over 13 months include varied user-side data like clicks, attention, hovers, scrolls etc. UPX0262 at -992 ("Glue is interested in all query events regardless of clicks, because it needs to compute abandonment and attention signals."); UPX0005 at -806 (listing clicks, attention, refinement, and swipes as among the user interactions on a SERP).

2. Scale Is Critical To The Development Process

196. Scale is a vital element for improving a GSE. Scale enables a GSE to observe more failures and use that information to identify ways to improve search results. Des. Tr. 154:5–13, 156:9–15, 177:4–178:10 (Google-PN 30(b)(6) Dep.) (Google looks for patterns in failed-query reports and finds ways to improve queries.); Tr. 2257:11–15 (Giannandrea (Apple)) ("[T]he more queries a search engine sees the more opportunities . . . the engineers have to look for patterns and improve the algorithm."); UPX0870 at .016 ("Analysis of logs data figures into launch decisions, ranking changes, and machine-learning data.").

197. GSEs also run experiments to ensure system changes result in quality improvements. UPX0265 at -476 (showing experiments undertaken for 665 search launches in 2015, including 118,812 precision evaluations, 10,391 side-by-side experiments, and 7,018 live-traffic experiments). Experiments are critical for GSEs to improve their search services. Des. Tr. 148:16–149:3 (Ribas (Microsoft) Dep.) ("Experiments are very critical for both improving the quality and improving the ability to grow. . . ."); UPX0213 at -714 ("Evaluation is the foundation of ranking.").

198. Scale allows search engines to run better experiments, in terms of accuracy and speed, to test potential system changes. Tr. 2646:7–22 (Parakhin (Microsoft)) ("If I have enough . . . traffic, I can quicker understand whether my changes are good or not or run more experiments at the same time."); Des. Tr. 62:6–63:18 (Ribas (Microsoft) Dep.) (Testing on a broader set of queries would allow Bing to improve more.); Des. Tr. 276:19–277:2 (Stein (IAC)

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Dep.) (agreeing that having additional clicks and query data would allow Ask.com to run more accurate experiments); Tr. 5793:24–5795:3 (Whinston (Pls. Expert)) ("[W]hen you don't have a lot of scale, you can't do a lot of these experiments. And moreover, the experiments that you do will tend to have smaller samples. So it's either going to be less precise, if you let the experiment go for the same amount of time, or it's going to have to go a lot longer. That's just a basic property of statistics: The bigger the sample, the more precise the results."); UPX1059 at -304 (For experiments, "[t]he more data you collect, the narrower the confidence interval," i.e., the more precisely the effects are measured.).

199. The scale benefits in development compound over time because of the iterative nature of the development cycle. Tr. 1791:16–1796:15 (Lehman (Google)) (better results leads to more informed user interaction, which leads to better training data, which leads to better models, which again leads to better results, and thus creates a "virtuous cycle" of improvement (discussing UPX1115 at -529)); UPX1120 at -532 (depicting the iterative nature of the cycle of product development); Tr. 10318:9–24 (Oard (Pls. Expert)) (ranking signals themselves are based upon user-side data that has been used over the years to develop those systems).

3. Scale Enables Better Targeted Ads And Improves Monetization

200. Scale also improves a search engines' Search Ads products by improving the targeting of the ads, increasing the pool of available ads, and improving monetization of ads. Des. Tr. 110:5–17 (Jain (Google) Dep.) (Providing larger amounts of data to Google would, in turn, result in "[b]etter [s]earch ads, better organic results."); *infra* ¶¶ 1030–1060 (§ VIII.A.4).

201. Google uses user data in two of the three major components of the auction that selects, ranks, and prices Search Ads. *Infra* ¶¶ 638–646 (§ V.C.5.b). First, Google trains its systems to predict ad click-through rates by relying on click and query data. UPX6027 at -567 (written 30(b)(6) response: "Google's predicted click-through rate (pCTR) machine learning

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model uses query and click data."). Components of its pCTR algorithm train on quantities of data greatly exceeding that possessed by any of Google's rivals. Tr. 8880:11–8881:9 (Israel (Def. Expert)) (acknowledging at least one component of pCTR model uses 12 months of data). Second, Google relies on click and query data to predict the quality of a Search Ad's landing page, UPX0021 at -376.006 (2017 launch adopting pLQ model trained on logs); Google made the decision to do this after determining user data produced better predictions than alternate methods. UPX0021 at -376.003, -376.006–07.

4. Scale Is Critical To Developing Ad Improvements

202. Google tests each change it makes to its ad systems—pricing, targeting, appearance, and so on—using a series of live, A/B experiments on user traffic. *Supra* ¶¶ 144–145 (§ III.C.3.b); UPX0889 at -787 (describing how Google uses logs analysis and advertiser experiments to evaluate pricing launches). Because of its massive scale, Google can get to statistical significance very quickly when conducting experiments on potential Search Ads launches. Des. Tr. 92:3–93:10 (Jain (Google) Dep.).

5. Contrary To Its Public Position, Internally Google Has Long Acknowledged The Importance Of Scale For General Search Engines

203. Google executives have long recognized the importance of user-side data at scale. For example, in 2008, Dr. Varian acknowledged the importance of scale. UPX0862 at -706–07 (concluding that "using data is integral to making Google web search valuable to our users" and that "the data in our search logs will certainly be a critical component of future breakthrough."). But by 2009, in public comments, Dr. Varian began calling scale effects "bogus." UPX0178 at -433; UPX0884 at -604.

204. Internally Google Search executives knew better and responded negatively to Dr. Varian's public statements minimizing the effects of scale. UPX0183 at -250 (Dr. Varian's

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public statements about scale are "bogus and misleading."). In an August 21, 2009 email chain between Udi Manber and Melissa Mayer regarding a TIME Magazine piece in which Dr. Varian sought to minimize the value of scale, Dr. Manber wrote "I wish we [could] find a way to downplay Hal's comments, as he was just plain wrong. I know it reads well, but unfortunately it's factually wrong." Ms. Mayer responded that "[t]he key issue here as I see it is that you do get better as you have more users -- that's why we have the best spell check, the best personalized search, the best refinements, etc. Most people who understand AT or machine learning as well as the size/scale of data would question his assertion/know that it's unlikely." UPX0177 at -419.

205. In an August 2009 email exchange with Dr. Varian, Dr. Manber stated that "it's absolutely not true that scale is not important. We make very good use of everything we get. [User Interface] experiments are done on a small percentage but ranking is using a lot more." UPX0179 at -435. Dr. Manber explained that "***The bottom line is this. If Microsoft had the same traffic we have their quality will improve *significantly*, and if we had the same traffic they have, ours will drop significantly. That's a fact.*** Is it the only factor? Of course not. Nothing is. Do we have other advantages? Of course we do. Is it very significant? Yes . . .. Your comments suggest very clearly that scale is not a significant factor for search, and that's factually wrong." UPX0179 at -435 (emphasis added).

206. In an August 2009 email to Bill Coughran, Dr. Manber addressed a statement from Dr. Varian implying scale was not important to search; Dr. Manber wrote "Scale always makes a difference in search. I am not sure what made him decide suddenly to talk about search, something he knows nothing about." Mr. Coughran replied by stating "I plan to raise this at Monday's OC meeting." UPX0875 at -025.

[redacted]

207. Google instructs its employees to not publicly discuss or acknowledge the use of "clicks" in search. UPX0204 at -208 ("Do not discuss the use of clicks in search, except on a need to know basis with people who understand not to talk about this topic externally. Google has a public position. It is debatable. But please don't craft your own."); UPX1066 at -880 (instructing in Antitrust Basics for Search Team to avoid discussions of "scale"); UPX0222 at -700 ("[O]ur heavy dependence [on] user feedback signals (aka 'clicks') in web ranking . . . . is an area where we aim to constantly sow confusion. . . . . RankBrain seems to have helped divert people from the idea that our primary use of user feedback is actually outside of RankBrain, which is nice.").

F. Google's Distribution Agreements

208. Google has paid to distribute search for nearly 20 years. For at least the past 12 years, Google's agreements have fallen into three buckets: (1) the ISA with Apple, (2) the RSAs and MADAs with Android OEMs and carriers, and (3) contracts with third-party browsers.

1. Information Services Agreement (Apple Devices)

209. Apple is a distributor of Google search, not an end user of Google's services. JX0033 at -794 (§ 1(a)) (Apple ISA (2016 amend.)) (defining "End User" as "a user of the Web Browser Software, Spotlight, or Siri"); Tr. 4930:4–10, 4932:3–5, 4977:10–12 (Braddi (Google)) (acknowledging the "search distribution relationship" and "search distribution agreement" between Google and Apple); *id*. 4945:3–4946:5 (agreeing that Google's search distribution relationship with Apple is built on negotiation).

210. Google earns advertising revenue from searches conducted on Apple devices. Tr. 2452:12–15 (Cue (Apple)). Under the Information Services Agreement (ISA), Google splits this revenue with Apple in exchange for being the exclusive default search engine pre-set on

[redacted]

Apple's Safari browser. Tr. 2452:16–23 (Cue (Apple)) (Google splits ad revenue with Apple); Tr. 7667:16–19 (Pichai (Google)) (Google pays Apple revenue share to be set as the default search engine on Safari); Tr. 4930:8–19 (Braddi (Google)); UPX6024 at -437 (written 30(b)(6) response: "Google's current [ISA] with Apple provides for Google to be the default search provider on Apple's Safari browser, allowing Google Search to be more accessible to Apple users and growing usage of Google Search by Apple users. This is especially important to Google given Apple's sizeable and valuable user base, for which Apple controls distribution.").

a) ISA: The Early Years

211. In 2002, Google and Apple entered into the ISA's first version. The 2002 ISA granted Apple a voluntary license to preinstall Google Search in Safari but did not require Apple to do so and did not provide for payment in either direction. Des. Tr. 25:18–26:7 (Apple-EC 30(b)(6) Dep.) (agreeing that the 2002 agreement had no revenue share term). The 2002 ISA provided: "Google hereby grants to Apple a worldwide, non-transferable, non-exclusive right to allow End Users of [Safari] to send web search queries from a search box in [Safari] to www.google.com, and to receive results pages from Google that will include web search results and, when applicable, advertising results." JX0001 at -678 (§ 2.1) (Apple 2002 ISA).

212. In 2005, Google co-founder Sergey Brin offered Apple revenue share for the first time. UPX0855 at -239 ("[W]e should consider sending a rev share or helping [A]pple out in other ways."); UPX0992 at -016 (email to Apple board member: "[Google] could also send some revenue [Apple's] way. . . . "); Des. Tr. 26:8–27: 21 (Apple-EC 30(b)(6) Dep.) (explaining that, for Apple, it "[n]ever crossed our mind" to ask Google for revenue share until "Google came to us and suggested it" because Google was "now making a lot of money on advertising" and told Apple "[w]e think you deserve some of that").

[redacted]

213. Following Mr. Brin's revenue-share proposal, Google and Apple amended the ISA in 2005, establishing that Google would pay Apple 50% of Google's net advertising revenue for queries conducted on Apple devices in exchange for a requirement that Apple make Google the pre-set default search engine in Safari. JX0002 at -818–19 (§§ 2, 3) (Apple ISA (2005 amend.)).

214. When Apple launched the iPhone in 2007, the ISA was expanded to pre-set Google as the default search engine for the mobile Safari browser on Apple's iPhones. JX0004 at -647 (§ 1) (Apple ISA (2007 amend.)) (revising "Software" definition to include Safari for iPhones). The 2007 ISA also made Google the pre-set default search engine for a new version of Safari built for Windows computers. JX0004 at -647 (§ 1) (Apple ISA (2007 amend.)) (revising "Software" definition to include Safari for computers running on Microsoft Windows operating system).

215. Between 2008 and 2010, Google and Apple extended the ISA four times with only minor modifications. JX0005 at -813 (§ 1) (Apple ISA (2008 amend.)) (extending term for Safari for Windows); JX0006 at -529 (§ 1) (Apple ISA (Jan. 14, 2009 amend.)) (extending term for Safari for Mac and Safari for Windows); JX0009 at -527–28 (§§ 1, 2) (Apple ISA (Aug. 1, 2009 amend.)) (extending term for all form factors and modifying revenue share rate); JX0012 at -688–89 (extending term for all form factors and modifying revenue share rate, among other things).

b) 2014 Joint Cooperation Agreement

216. In 2014, Google and Apple amended the ISA through a Joint Cooperation Agreement (JCA), which extended the ISA for a new, ten-year term. JX0024 (Apple JCA (2014)) at -822.

[redacted]

217. The JCA was a worldwide agreement with carveouts for China, South Korea, and Russia. JX0024 (Apple JCA (2014)) at -822 (§ 1, ¶ 3) ((Apple JCA (2014)). In those three countries, Apple had the option to select a default search engine for Safari other than Google. *Id.* The JCA also required Google to consider, in good faith, additional carveouts for countries where Google's GSE market share declined to [redacted]% or less. JX0024 at -822 (§ 1, ¶ 4) ((Apple Joint Cooperation Agreement (2014)). Market share was calculated based on Google's usage [redacted]. JX0024 at -822 (§ 1, ¶ 4).

218. During the parties' negotiations, Apple initially requested that its right to set another search engine as default be automatically triggered when Google's share declined by [redacted]% in a given country, but Google rejected this request and agreed only to consider additional country carveouts in good faith. UPX0669 at -845 (listing Apple's proposal that "[a]dditional single country options if Google search shares declines by [redacted]% or more within that country"); UPX0751 at -904 ("We cannot agree to a carveout triggered by [redacted]% drop in search share, or any other market share based trigger. If Google search becomes severely compromised in a specific country, we can agree to hold good faith discussions about whether the default search requirement needs to be adjusted.").

c) Current ISA

219. In 2016, Google and Apple agreed to substantially rewrite the ISA, establishing most of the terms that remain in place today. JX0033 (Apple ISA (2016 amend.)). Although Google and Apple amended the ISA again in 2021, the 2021 amendment "was just an extension of the dates," and the terms of the 2016 amendment remain operative. Tr. 2453:12–2454:5 (Cue (Apple)); JX0097 at -357 (Apple ISA (2021 exten.)) ("The provisions of this Ninth Amendment are effective as of the Execution Date, and the remaining provisions of the ISA that are unchanged by this Ninth Amendment shall remain in full force and effect").

[redacted]

220. In the United States, the current ISA is effective until at least September 30, 2026. JX0097 at -357 (§ 1) (Apple ISA (2021 exten.)). The agreement provides that Apple may unilaterally extend the agreement for two years (until September 30, 2028), and that Google and Apple may mutually agree to extend the agreement for another three years beyond that (until September 30, 2031). JX0097 at -357 (§ 1) (Apple ISA (2021 exten.)); Tr. 2501:12–2502:2 (Cue (Apple)) (describing extension rights).

221. Apple currently has no unilateral right to terminate its agreement with Google. The 2016 amendment expressly removed this right, which had existed in each prior version. *Compare* JX0033 at -800 (§ 7) (Apple ISA (2016 amend.)) ("The parties expressly amend the existing ISA Agreement to remove the right of either party to terminate at will"), *with, e.g.*, JX0024 at -822 (Apple JCA (2014)) (granting either party the right to termination at will).

222. At Google's request, the current ISA includes a "Regulatory and Government Actions" clause, which requires Apple and Google to "cooperate to support and defend the ISA Agreement[.]" JX0033 at -801 (§ 9) (Apple ISA (2016 amend.)) ("Apple and Google will cooperate to support and defend the ISA Agreement, work in good faith to modify it if necessary to resolve regulatory concerns, and not intentionally delay or prevent implementation of the ISA Agreement"); Tr. 2467:6–17 (Cue (Apple)) (this request "came from Google"). That clause further recognizes that the parties may need to "renegotiate the Ad Revenue Share in an effort to preserve the overall intended economic benefit of the deal" as a result of regulatory action or a court order. JX0033 at -801 (§ 9) (Apple ISA (2016 amend.)).

i. ISA's Default Requirement

223. Under the current ISA, on all Apple devices, the company must set Google as Safari's default search engine. JX0033 at -793 (§ 1(a)) (Apple ISA (2016 amend.)) ("Apple will pre-set and use [Google] as the Default search service for Search Queries in Apple's web

[redacted]

browser software (e.g., Safari or successor versions) designed for use on (i) one or more of the following Apple operating systems: iOS, watchOS, tvOS, macOS or an other operating system made generally available by Apple during the Term, or (ii) the Microsoft Windows operating system"); Tr. 2452:9–11 (Cue (Apple)) (the ISA applies to "[a]ll Apple devices with a browser or browser-like technology"). This includes Safari's private browsing mode, which is a browsing mode for which Apple does not accumulate browsing history. Tr. 2172:19–2173:5 (Giannandrea) (Apple)) (defining Safari's private browsing mode)*; id.* 2174:11–2175:23 (the pre-set default search engine for Safari's private browsing mode "for every Apple device in the United States is set to Google").

224. If Apple pre-sets another GSE as the default on a single device, it loses all its revenue share with Google. UPX0588 at -578 (summarizing Apple's obligation to pre-set Google as default "for all search queries in Safari" as necessary "[i]n order to receive [Apple's] revenue share"). The geographic coverage established by the JCA, *supra* ¶ 217, remains in place, which means Apple must pre-set Google as the only default search engine in all countries except for China, South Korea, and Russia. JX0033 at -793 (Apple ISA (2016 amend.)) (preserving preexisting terms of the ISA, including geographic scope of JCA); Tr. 2477:8–10 (Cue (Apple)) (noting the ISA is a "global agreement"); *id*. 2478:2–8 (Apple cannot set Google as the search provider internationally and a different search provider in the United States).

ii. ISA's Revenue Share Provisions

225. Under the current ISA, Google pays Apple 40% of the net advertising revenue that Google earns from queries conducted in Safari. JX0033 at -797 (§ 4) (Apple ISA (2016 amend.)); Tr. 2465:24–2466:10 (Cue (Apple)) (agreeing that Google has paid Apple 40% of net advertising revenue (referring to Row B of Rosetta stone at UPX4001) since 2016). [redacted]

[redacted]

[redacted] JX0033 at -797 (§ 4) (Apple ISA (2016 amend.)); Tr. 2455:23–2456:5, 2493:14–17 (Cue (Apple)) (Apple does not preload either the Google Search App or Chrome.).

226. After accounting for cost deductions permitted under the ISA, the 40% net revenue share translates to 36% of the gross revenue that Google earns from queries conducted in Safari [redacted]. JX0033 at -797–98 (§ 4) (Apple ISA (2016 amend.)) (defining "Net Ad Revenue" as allowing for operating deductions from the revenue earned from Safari queries, [redacted]); UPX0587 at -576 (Apple diagram depicting how net revenue share is calculated); Tr. 9783:21–9785:15 (Murphy (Def. Expert)) (acknowledging revenue share rate of 36%).

iii. ISA's Restrictions On Apple's Search And Search Ad Activities

227. Under the current ISA, Apple's implementation of Google as default in Safari must remain "substantially similar" to Apple's implementation in 2016. The ISA refers to this requirement as the "Permissible Software Default Use." JX0033 at -793 (§ 1(a)) (Apple ISA (2016 amend.)) ("During the Term, Apple's use of [Google] as Default in [Safari] will remain substantially similar to its use (including, without limitation, vis-à-vis other providers of internet services) as of the Execution Date of this Agreement (such use, the 'Permissible Software Default Use')"); UPX0588 at -578 (Apple summary referring to this restriction as the "Safari Search Limitation").

228. In addition to the general application of the "Permissible Software Default Use," the ISA also contains clauses that expressly apply this restriction to aspects of Apple's product design. For example, Apple's ability to "alter, modify and innovate" Safari is "[s]ubject to the

[redacted]

Permissible Software Default Use." JX0033 at -793 (§ 1(a) (second paragraph)) (Apple ISA (2016 amend.)). Google included this restriction in the 2016 amendment over Apple's objection. UPX0595 at -938 (Sept. 17, 2016 email from Cue to Pichai) (advocating for draft language that would have granted Apple the right to "alter, modify and innovate" Safari without limitation by the "Permissible Software Default Use" because "we need the ability to innovate however we see fit"); UPX0611 at -465 (Sept. 19, 2016 Pichai response) (maintaining Google's position that this draft language be "subject to the Permissible Software Default Use" restriction to "preserve the value of the deal for Google").

229. The ISA also contains clauses applying the Permissible Software Default Use restriction to Apple's ability (1) to carve out user requests from the queries that Apple sends to Google, (2) to use Siri to respond to queries in Safari, and (3) to "pre-populate" queries as they are entered by users in Safari. JX0033 at -793 (§ 1(a) (fourth paragraph)), -795 (§ 1(c) (third paragraph)), -797 (§ 4 (fourth paragraph)) (Apple ISA (2016 amend.)).

230. At Google's request, the ISA also contains a term requiring that, if Apple wishes to display advertisements in Siri or Spotlight, Apple must provide Google the right of first refusal to supply the advertisements *under the existing terms*. JX0033 at -796 (§ 2) (Apple ISA (2016 amend.)) ("Following the initial implementation of the Spotlight Services or Siri Services, if Apple includes ads or paid listings in Siri or Spotlight (or successor versions), Apple will offer Google the opportunity to supply such ads or paid listings under the financial terms set forth in Section 4 of this Agreement and on equivalent implementation terms."); Tr. 2498:1–4 (Cue (Apple)) (agreeing that Google would have "the right of first refusal to offer the ads themselves"); *id*. 2497:11–25 (this was "something that Google wanted to have").

[redacted]

2. Google Search Distribution Agreements With U.S. Carriers And Android OEMs

231. Carriers and Android OEMs are distributors, not end users, of Google's services. UPX6059 at -032 (Alphabet 2021 Form 10-K stating, "[O]ur distribution partners include browser providers, mobile carriers, original equipment manufacturers, and software developers."); JX0091 at -745 (§ 1.29) (AT&T RSA (2021)) (defining "end user" as "any human end user of a Device or Qualified Device"); JX0049 at -866 (§ 1.17) (Motorola MADA (2018)) (defining "end user" as "a human end user of a Device"); JX0037 at -053 (§ 1.13) (Samsung MADA (2017)) (defining "end user" as "an end user of a Device") UPX0719 at -712–13 (distinguishing between needs of users, advertisers/agencies, and partners (i.e., "search partners, content partners, mobile partners, book search partners, ISPs, etc.")).

232. Three OEMs (Samsung, Motorola, and, until recently, LG) have manufactured most Android mobile devices sold in the United States. Tr. 1516:4–21 (Yoo (Google)) (discussing UPX0141); Tr. 775:2–5 (Kolotouros (Google)) (Samsung and Motorola manufacture the majority of the Android phones for sale in the United States.). Several other OEMs manufacture Android devices sold in the United States, including Sony Corp. (Sony)[5] and

[5] UPX5188 (Sony DA (2005)); UPX5189 (Sony DA (2005 amend.)); UPX5190 (Sony DA (2006 amend.)); UPX5191 (Sony DA (2007 amend.)); UPX5192 (Sony DA (2008 amend.)); UPX5208 (Sony DA (2008)); UPX5193 (Sony DA (2008 amend.)); UPX5194 (Sony DA (2009 amend.)); UPX5167 (Sony MADA (2009)); UPX5168 (Sony MADA (Apr. 2011)); UPX5209 (Sony MADA (Oct. 2011)); UPX5169 (Sony MADA (2014)); UPX5195 (Sony RSA (2014)); UPX5170 (Sony MADA (Aug. 2016 amend.)); UPX5196 (Sony RSA (Aug. 2016 amend.)); UPX5197 (Sony RSA (Sept. 2016 amend.)); UPX5198 (Sony RSA (Dec. 2016 amend.)); UPX5171 (Sony MADA (Jan. 2017 amend.)); UPX5199 (Sony RSA (Jan. 2017 amend.)); UPX5172 (Sony MADA (Mar. 2017 amend.)); UPX5200 (Sony RSA (Mar. 2017 amend.)); UPX5201 (Sony RSA (June 2017 amend.)); UPX5173 (Sony MADA (July 2017 amend.)); UPX5174 (Sony MADA (Sept. 2017 amend.)); UPX5202 (Sony RSA (Sept. 2017 amend.)); UPX5203 (Sony MADA (2017)); UPX5176 (Sony MADA (June 2018amend.)); UPX5204 (Sony MADA (Nov. 1 2019 amend.)); UPX5177 (Sony MADA (Nov. 8 2019 amend.)); UPX5205 (Sony RSA (2019 amend.)); UPX5179 (Sony MADA

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Google, which sells Google-branded Pixel devices. UPX0488 at -032 (identifying Pixel phones as one of Google's hardware businesses); UPX0317 at -159 (identifying Pixel as part of OEM shipments in the USA).

233. Carriers sell the majority of Android devices purchased in the United States (80–90%). Tr. 1514:10–19 (Yoo (Google)). Carriers purchase cellphones from OEMs like Apple and Samsung and sell the devices to consumers through the carriers' stores and online. *Id.* 1514:10–19 (discussing UPX0141); Tr. 9314:1–16 (McCallister (Google)). Verizon, AT&T, and T-Mobile are the three largest carriers in the United States. Tr. 9313:24–25 (McCallister (Google)). Sprint, previously the fourth-largest carrier, merged with T-Mobile in 2020. Des. Tr. 186:16–20 (Giard (T-Mobile) Dep.); Tr. 1515:15–25 (Yoo (Google)).

234. Google enters into two types of distribution agreements with Android partners: (1) MADAs, and (2) RSAs. UPX0141 (describing the major search distribution terms of the MADAs and RSAs).[6]

a) MADAs

235. Google and Android OEMs enter into distribution agreements, called MADAs. MADAs allow OEMs to preinstall and distribute Google applications and software, also known as Google Mobile Services (GMS), on Android devices. *E.g.*, JX0049 at -867–68 (§ 2.1) (Motorola MADA (2018)) (licensing Motorola to distribute Google applications); JX0037 at -055 (§ 2.1) (Samsung MADA (2017)) (licensing Samsung to distribute Google applications);

(Dec. 2019 amend.)); UPX5206 (Sony MADA (2020 amend.)); UPX5207 (Sony RSA (2020)).

6 Google also enters Android Compatibility Commitments (ACCs) or Antifragmentation Agreements (AFAs) with Android OEMs, which prevent OEMs from distributing Android devices (with limited exceptions) that do not comply with a set of technical requirements. These requirements do not address search defaults. *E.g.*, DX0870 (Samsung AFA (2019)); DX0861 (Motorola ACC (2018)).

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Tr. 775:6–17 (Kolotouros (Google)) (MADA is a license to distribute Google Mobile Services on Android compatible devices); UPX6027 at -561 (written 30(b)(6) response: GMS currently includes "Google Search, Google Play Store, Google Chrome, YouTube, Google Maps, Gmail, Google Photos, YouTube Music, Google Duo, Google Drive, and Google Play Movies and TV").

236. Google's guiding principle for determining which apps to include in the MADA bundle is whether or not the app will generate revenue for Google. Tr. 9572:1–16 (Rosenberg (Google)); UPX0296-A at -500.

237. For more than a decade, Google has had MADAs with all the major OEMs selling Android devices in the United States: Samsung, Motorola, and LG (until LG exited the market).[7]

i. Google Play Store

238. Google's Play Store is the most popular and largest app store for Android mobile devices. Des. Tr. 91:8–15 (Baxter (Samsung) Dep.) (Play Store is "clearly the largest" app store in the United States for Android devices based on number of apps.); Des. Tr. 358:15–359:17 (Ezell (AT&T) Dep.) (primary app store for Android devices is Google Play); Des. Tr. 141:13–16 (Christensen (Motorola) Dep.) (not aware of any Motorola devices in the United States with an app store besides Google Play). The Google Play Store and Google Play Services (GPS) (also called GMS core) are part of GMS. Tr. 786:13–17 (Kolotouros (Google)) ("The MADA is

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[7] JX0007 (Samsung MADA (2009)); JX0013 (Samsung MADA (2011)); JX0025 (Samsung MADA (2014)); JX0037 (Samsung MADA (2017)); UPX5514 at -297 (§ 2) (Samsung MADA (2020 amend.)) (extending JX0037 to Dec. 31, 2021); JX0008 (Motorola MADA (2009)); UPX5404 (Motorola MADA (2012)); JX0023 (Motorola MADA (2014)); JX0049 (Motorola MADA (2018)); JX0099 at -997 (§ 2.2) (Motorola MADA (2020 amend.)) (extending JX0049 to at least Jan. 1, 2021, and to Jan. 1, 2022, if neither party provided 60 days' notice); UPX5338 (LG MADA (2009)); UPX5339 (LG MADA (2011)); UPX5340 (LG MADA (2013)); UPX5352 (LG MADA (2017)).

[redacted]

required to license both the GMS applications and also GMS core, otherwise known as Google Play Services.”).

239. Google’s Play Store is a key revenue source for Google. Tr. 9545:1–3 (Rosenberg (Google)); *id*. 9553:17–19 (the more users on Android devices, the more money Google can make from the Play Store). For example, Google projected that it would earn $[redacted] billion in revenue from Google Play Store on Samsung devices during the term of the 2020 Samsung RSA. Tr. 9550:12–9551:1 (Rosenberg (Google)). *Infra* ¶ 300 (Samsung’s 2020 RSA has a four-year term).

240. Google Play Store is a must-have for Android devices; it is not commercially feasible for an OEM to ship Android devices without Google Play Store preinstalled. Tr. 6:13–21 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (discussing UPX0312, Yoo agreed that there was a near-zero probability that Samsung would not want the Play Store because it is necessary for Samsung to offer users a variety of apps on its phones); Tr. 3517:6–25 (Nadella (Microsoft)) (an Android phone without the Play Store is a “brick”; everyone else has carrots to win deals, but the Play Store gives Google a “big stick”); Tr. 3125:10–22 (Tinter (Microsoft)) (Ultimately for Duo to be successful, Microsoft needed the Play Store license from Google.); Tr. 1024:23–1025:6 (Higgins (Verizon)) (The Play Store comes preloaded on Android devices that Verizon sells in the United States, and he is unaware of Verizon selling an Android device in the United States without the Play Store.); Des. Tr. 111:15–21 (Giard (T-Mobile) Dep.) (The Play Store is very important to the success of Android phones that T-Mobile distributes; it is the primary way that users access apps they want on their devices.); Des. Tr. 358:15–359:17 (Ezell (AT&T) Dep.) (It is important that there is an app store on an Android device, and the primary app store for Android devices is Google Play.); UPX0312 at -154) (“OEMs want the Play store on their

[redacted]

phone, and in return we are able to get other apps like Google search . . . on the phone as a result.”).

241. Indeed, every Android phone sold in the United States has the Google Play Store preinstalled. Tr. 12:8–10 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (not aware of any Android smartphones sold in the United States without the Play Store); Des. Tr. 92:24–93:2 (Baxter (Samsung) Dep.) (unaware of any Samsung smartphones in the United States sold without the Play Store preinstalled).

242. Google does not view the Samsung Galaxy Store as a threat to the Play Store. UPX1011 at -290 (Galaxy Store has “0 notable exclusive titles in 2019,” “[o]nly 2 out of Play top 50 free games continue to be present on Galaxy Store,” and “[w]e believe that the cannibalization of Play store revenue due to Galaxy store is none to minimal.”); UPX0312 at -154 (“I think there is a near-zero probability of Samsung not wanting the Play store on their phone.”). Rival app stores are unlikely to succeed on Android devices because the Google Play Store is protected from competition by network effects. UPX2106 at -590 (“Play benefits from network effects. Users come to Play because we have by far the most compelling catalog of apps / games[.] Developers come to Play because that’s where the users are.”); UPX0303 at -120 (2014 Samsung submission to the European Commission stating, “[g]iven the nature of the mobile app ecosystem, Google’s first mover advantage continues to snowball, since Google Play will attract more app developers and end users as its popularity continues to grow.”); UPX2106 at -587 (Even with discounts, the “switching hurdle [is] too high for most users” to switch from the Play Store to the Amazon app store.).

243. GPS/GMS Core are a set of Google-proprietary application programming interfaces (APIs) that support Android apps’ functionality. Tr. 784:7–785:5 (Kolotouros

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(Google)) (Google Play Services are available to developers whose apps are in the Play Store.); UPX0125 at -066 ("Google Play Services / GMS Core is an important element of Play"; GPS/GMS Core APIs are a "set of Google APIs that help support functionality of all Android applications"). In 2016, "826 out of the top 1000 Android apps use[d] 1 or more GMS Core APIs (Facebook, WhatsApp, Twitter, and many other apps)." UPX0125 at -066.

244. The only way for an OEM to license the Google Play Store and GPS/GMS Core is by signing a MADA. Tr. 1529:19–1530:2 (Yoo (Google)) (To put the Google Play Store on its devices, an OEM must sign a MADA.); Des. Tr. 144:9–15 (Christensen (Motorola) Dep.) (agreeing that one reason Motorola agrees to the MADA is to obtain a license for Google's APIs, as well as Google applications).

ii. MADA Requirements

245. If an OEM wants to preinstall any one Google app on an Android device, including the Google Play Store, the OEM must preinstall a suite of 11 mandatory Google apps, including the Google Search App and Chrome. JX0037 at -055 (§ 2.1) (Samsung MADA (2017)); JX0049 at -868 (§ 2.1) (Motorola MADA (2018)); Tr. 778:16–19 (Kolotouros (Google)) (for an Android device to be a GMS device, all 11 Google apps listed in UPX0129 at -905 must be preinstalled); UPX0129 at -905 (listing 11 GMS apps that must be preinstalled under the MADA).

246. Six of these mandatory apps must be preinstalled so that they are undeletable by the user: Google Search, Chrome, Gmail, Maps, YouTube, and Google Play Store. Tr. 946:10–12 (Kolotouros (Google)); UPX6027 at -563 (written 30(b)(6) response: "Samsung's, LG's, and Motorola's current MADAs provide for preinstallation of six 'Core' applications, as well as GMS Core Services, on the system partition of the hard drive of an Android device that is inaccessible to the user: Google Search, Chrome, Gmail, Maps, YouTube, and Google Play.").

[redacted]

These six apps are referred to as the Core Apps. UPX5511 at -984 (§ 1.1) (Samsung MADA (2020 amend.)); Tr. 946:13–23 (Kolotouros (Google)) (describing the apps as "core utilities").

247. In addition to preinstalling the 11 mandatory GMS apps, the MADA also contains placement requirements. The MADA requires the OEM (1) to place the Google Search Widget and the Google Play Store on the default home screen and (2) to place the Google Search App and Chrome, at a minimum, in a folder labeled "Google" on the default home screen. UPX0141 at -244; UPX5511 at -987 (§ 2.8) (Samsung MADA (2020 amend.)); JX0049 at -871–72 (§ 4.4) (Motorola MADA (2018)); Tr. 793:21–23 (Kolotouros (Google)) (all MADAs require the Google Search Widget to be placed on the default home screen); *id*. 795:5–7 (all MADAs require a Google-labeled folder or icon to be placed on the default home screen).

248. MADAs require OEMs to take Google apps "as-is," which means that OEMs may not change the apps' default settings. For example, an OEM is prohibited from changing Chrome's default search. UPX0662 at -147 (when Google discovered a Chinese OEM had set the default search in Chrome to Bing, Google immediately told the OEM it was problematic and not to do it again).

249. Finally, the MADA prohibits OEMs from directing, instructing, or encouraging consumers to change any of a device's out-of-the-box settings. UPX5511 at -987 (§ 2.9) (Samsung MADA (2020 amend.)) (requiring that Samsung "not include any processes, instructions, promotions, or other means that directs, instructs or encourages the End User to change the Device from being in compliance with" the MADA in the initial device setup); JX0099 at -998 (§ 2.9) (Motorola MADA (2020 amend.)) (same); Tr. 799:25–801:22 (Kolotouros (Google)) ("This language does not allow an OEM to essentially encourage . . . a user to change the settings of the defaults or the placements as has been configured per the

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MADA" and there is language that "would prohibit the OEM from instructing a user how to change the . . . out-of-box configuration of a device.").

250. MADAs generally have initial two-year terms. JX0025 at -867 (Samsung MADA (2014)) (two years); JX0037 at -052 (Samsung MADA (2017)) (two years); JX0023 at -349 (Motorola MADA (2014)) (two years); JX0049 at -863 (Motorola MADA (2018)) (two years); UPX5352 at -939 (LG MADA (2017)) (two years).

251. In the past, some MADAs contained a requirement that made Google the default search engine for search access points on the device. *E.g.*, Tr. 820:9–13 (Kolotouros (Google)) ("[T]here was a term in the MADA that secured default search on the access points . . . ."); JX0013 at -121 (§ 3.4) (Samsung MADA (2011)) ("Google Phone-top Search must be set as the default search provider for all search access points on the Device."). The search default requirement was eventually removed from the MADA. Tr. 822:21–25 (Kolotouros (Google)) (The search default requirement was moved from the MADAs to the RSAs after September 2014.); UPX0616 at -540 (2014 email stating that Mr. Pichai supported moving the MADA's search default requirements to the RSAs).

252. Although carriers do not sign MADAs, the Android devices that carriers sell to U.S. consumers are subject to the MADAs of the OEM that manufactured those devices. Tr. 802:19–803:8 (Kolotouros (Google)) (If an OEM builds an Android mobile device for a carrier, that device must comply with the relevant MADA terms.); Tr. 1516:24–1517:10 (Yoo (Google)) (The Android devices that carriers sell are subject to the MADAs of the OEM that manufactures those devices.).

b) RSAs

253. Google enters into Search Ad RSAs with Android OEMs and U.S. carriers. UPX6024 at -428 (written 30(b)(6) response: "Since 2005, Google has negotiated and entered

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into hundreds of revenue share agreements (including amendments thereto) with dozens of third parties."); *e.g.*, JX0091 (AT&T RSA (2021)); JX0095 (T-Mobile RSA (2021)); JX0093 (Verizon RSA (2021)); JX0071 (Samsung RSA (2020)); JX0062 (Motorola RSA (2020)).

254. For more than a decade, Google has had RSAs with all major U.S. carriers and OEMs that sell Android mobile devices in the United States. Tr. 1514:10–19, 1516:17–23 (Yoo (Google)).[8]

255. Generally, the initial terms of carrier and OEM RSAs are around two years, but some have had terms as long as four years. The ultimate duration of each RSA depends on ad hoc amendments that vary in length. *E.g.*, JX0015 at -980 (AT&T RSA (2011)) (2 years); JX0091 at -741 (AT&T RSA (2021)) (3 years); JX0093 at -487 (Verizon RSA (2021)) (2 years); JX0095 at -687 (T-Mobile RSA (2021)) (3 years); JX0041 at -966 (Samsung RSA (2017)) (2 years); JX0071 at -392 (Samsung RSA (2020)) (4 years); JX0061 at -099 (§ 2) (AT&T RSA (2018 amend.)) (extending the RSA by 4 months); UPX5457 at -348 (§ 2) (Samsung RSA (2011 amend.)) (extending the RSA by 2 years, 2 months).

256. Through the RSAs, Google pays either a share of the Search Ad revenue earned through covered search access points or, in some recent agreements, a flat bounty for every qualifying Android device the distributor sells. *E.g.*, Des. Tr. 83:17–84:16 (Levine (Google) Dep.) (explaining what revenue share is); JX0093 at -515 (Attachment A) (Verizon RSA (2021))

[8] *E.g.*, JX0015 (AT&T RSA (2011)); JX0021 (AT&T RSA (2013)); JX0050 (AT&T RSA (2018)); JX0091 (AT&T RSA (2021)); JX0010 (Verizon RSA (2009)); JX0093 (Verizon RSA (2021)); JX0011 (T-Mobile RSA (2009)); JX0022 (T-Mobile RSA (2013)); JX0047 (T-Mobile RSA (2017)); JX0095 (T-Mobile RSA (2021)); UPX5533 (Sprint RSA (2008)); UPX5553 (Sprint RSA (2013)); UPX5536 (Sprint RSA (2017)); JX0014 (Samsung RSA (2011)); JX0041 (Samsung RSA (2017)); JX0071 (Samsung RSA (2020)); JX0003 (Motorola RSA (2005)); JX0039 (Motorola RSA (2017)); JX0062 (Motorola MIA (2020)); UPX5375 (LG RSA (2007)); UPX5363 (LG RSA (2013)); UPX5364 (LG RSA (2014)); UPX5368 (LG RSA (2017)); UPX5392 (LG MIA (2020)).

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(describing revenue sharing); JX0095 at -692 (§ 1.50) (T-Mobile RSA (2021)) (describing flat monthly payments); JX0091 at -765 (Attachment A) (AT&T RSA (2021)) (describing revenue sharing); JX0071 at -416–18 (Samsung RSA (2020)) (describing revenue sharing); JX0062 at -197–200 (Motorola MIA (2020)) (describing tiered monthly payments).

257. Google has paid billions of dollars in revenue share to Android RSA partners over the years. Tr. 7667:12–15 (Pichai (Google)); Tr. 5727:5–5728:11 (Whinston (Pls. Expert)) (discussing UPXD104 at 19 (showing Google's RSA payments for U.S. queries to Android OEMs and carriers from 2014 to 2020) and noting that Google has paid its RSA partners, including Android partners, "billions and billions and billions of dollars").

258. Google offers Android distributors payments in exchange for exclusivity and prime placement for search. UPX0573 at -244 ("We offer revenue share to carriers in exchange for exclusivity and prime placement on search, and in exchange for prime placement on Play."); UPX0547 at -183 (2009 Mobile Deal Guidance stating that "exclusivity" is a "Standard Deal Requirement[]"); UPX6024 at -435 (written 30(b)(6) response: "Google's current RSA agreements with Android partners AT&T, Verizon, T-Mobile-Sprint, and Samsung contain various provisions providing enhanced placement and/or promotion of Google services and applications, including Search, Assistant, and Chrome.").

259. To maximize the payments they receive from Google, distributors must make Google the exclusive, out-of-the-box default GSE on their Android devices. Tr. 7666:11–18 (Pichai (Google)) (Android RSAs have "pre-load exclusivity" that makes Google the exclusive default out-of-the-box); Tr. 1520:22–1522:10 (Yoo (Google)) (discussing UPX0141 and stating the terms of the RSA template require (1) "Device exclusivity" and (2) Google to be set as the default search engine on all search access points); Tr. 817:23–818:13 (Kolotouros (Google))

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(discussing UPX0129 and agreeing that for a partner to earn the highest revenue share under an RSA, all search access points on the device must be set to Google Search); Des. Tr. 153:15–24, 154:3–15 (Levine (Google) Dep.) (confirming "[f]or a device to qualify for rev share . . . it had to have search exclusivity outside the box"); Tr. 10090:8–24 (Murphy (Def. Expert)) (Google has "preinstallation exclusivity under most of the RSAs we've seen," which means they have the exclusive on that device out of the box.); UPX0141 at -818 (listing "Device exclusivity" and "Default on all access points" as current template RSA terms as of 2018); UPX0578 at -038 (RSA provides "[f]ull exclusivity"); UPX1128 at -097 (Business Council review of RSA 2.0 coverage expansion indicating that the "rationale in support of the deal" included "Google receives search exclusivity on in-scope devices with regional exclusions; expected to increase mobile and tablet search revenue coverage from 63% to 85%"); UPX0603 at -371 (indicating that the first objective of the 2020 Samsung deal was to "[s]ecure platform level distribution and protections for Search & Assistant").[9]

260. Default exclusivity is achieved through two types of RSA provisions. First, the RSAs require the distributor to set Google as the default search for all search access points on the device and, in some cases, give those search access points premium placement (e.g., Google must be the default search for search access points on all preinstalled browsers, the Google Search Widget must be placed on the default home screen). JX0093 at -498–502 (§§ 4, 5), -516–18 (Attachments B & C) (Verizon RSA (2021)) (describing search access point requirements);

[9] *E.g.*, JX0091 at -751–52 (§ 4), -765 (Attachment A), -766–68 (Attachment B) (AT&T RSA (2021)); JX0093 at -499–501 (§ 5), -515 (Attachment A), -516 (Attachment B), -517–18 (Attachment C) (Verizon RSA (2021)); JX0095 at -696–99 (§ 4), -712–13 (Attachment A) (T-Mobile RSA (2021)); JX0071 at -401–03 (§§ 4, 5), -416–18 (Attachment A), -419–20 (Attachment B-1), -422–424 (Attachments C-1 & C-2) (Samsung RSA (2020)); JX0062 at -186–87 (§ 5), -197–200 (Attachment A) (Motorola RSA (2020)).

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JX0095 at -696, -712–13 (§ 4, Attachment A) (T-Mobile RSA (2021)) (describing search access point requirements); JX0091 at -751–53 (§ 4), -766–68 (Attachment B) (AT&T RSA (2021)) (describing search access point requirements); JX0071 at -401–03 (§§ 4, 5), -419–20 (Attachment B-1), -422–24 (Attachments C-1 & C-2) (Samsung RSA (2020)) (describing search access point requirements); JX0062 at -184–87 (§§ 4, 5) (Motorola MIA (2020)) (describing search access point requirements); UPX5392 at -120 (Attachment F) (LG MIA (2020)); Tr. 7666:25–7667:3 (Pichai (Google)) (explaining that an OEM or carrier will receive full revenue share on an Android device only if all the device's search access points are set to Google); UPX0317 at -176 ("What we get" from RSA includes "Device exclusivity + Defaults").

261. Second, the RSAs prohibit the distributor from preinstalling any "alternative search service" or setting any "alternative search service" as the default for any search access point on the device. *E.g.*, JX0093 at -489, -500–01 (§§ 1.5, 5.2) (Verizon RSA (2021)) (prohibition on implementing alternative search services); JX0095 at -689, -696–97 (§§ 1.3, 4.2) (T-Mobile RSA (2021)) (prohibition on implementing alternative search services); JX0091 at -743, -752 (§§ 1.5, 4.2) (AT&T RSA (2021)) (prohibition on implementing alternative search services); JX0071 at -394, 403 (§§ 1.5, 5.2) (Samsung RSA (2020)) (prohibition on implementing alternative search services); JX0062 at -177, -185 (§§ 1.7, 4.3) (Motorola MIA (2020)) (prohibition on implementing alternative search services); UPX5401 at -016 (August 11, 2020 letter from Google to Motorola stating that the prohibition on alternative search services in MIA § 4.3 will not apply to the [lower revenue share] Foundation Tier, but will apply to the Premier Tier).

262. The RSAs generally define an "Alternative Search Service" to be any service "substantially similar to Google Search"—in other words, a general web search service.

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Tr. 840:11–15 (Kolotouros (Google)) (An alternative search service is "a service which is similar to Google search"; this would mean a service that returns "[g]eneral web search results when connected" to the internet.); Des. Tr. 174:23–175:11, 175:14–23, 176:1–176:5 (Ramalingam (Yahoo) Dep.) (only general web search services were prohibited by the RSA between Google and Verizon); UPX6026 at -552–53 (written 30(b)(6) response: "Although the precise definition of 'alternative search service' can and does vary by partner and by contract, the definition of this term typically encompasses, for example, applications, products, or services—other than Google search or Google applications—that deliver search results consisting of Internet content in response to user queries in a manner that is substantially similar to Google search."); UPX6026 at -553 (written 30(b)(6) response: "'[A]lternative search services' refers to services on RSA devices that offered 'general web search,' meaning services that 'search[] the web for . . . web results to general queries.'"); UPX6026 at -553 (written 30(b)(6) response: "'[A]lternative search services' . . . exclude search services that return results . . . confined to a particular category (and, in some cases, a small number of categories)."); UPX6030 at -621 (written 30(b)(6) response: "Examples of such services that deliver research results by searching the Internet in a manner substantially similar to Google Search include Bing and Yahoo Search").[10]

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[10] *E.g.*, JX0071 at -394 (§ 1.5) (Samsung RSA (2020)) ("'Alternative Search Service' means any web or on-device search service (including on-device search that incorporates multiple vertical search functionalities) that offers functionality that is similar to Google Search"); JX0091 at -743 (§ 1.5) (AT&T RSA (2021)) ("'Alternative Search Service' means any application, product, or service, other than Google Search, which, in response to queries, delivers search results consisting of (a) Internet content or (b) content from multiple applications on a Device that are owned by entities that are not Affiliates of one another, in each case of (a) and (b), in a manner that is substantially similar to Google Search."); JX0093 at -489 (§ 1.5) (Verizon RSA (2021)) ("'Alternative Search Service' means (a) any web search or (b) any on-device search service that in response to queries incorporates multiple vertical search functionalities, and that, in each case of (a) and (b), offers functionality that is substantially similar to Google Search (as determined by Google in its reasonable discretion), is not owned by Google or its Affiliates, and is not among the Google Applications.");

[redacted]

263. Google dictates what constitutes a search access point and an "alternative search service" (i.e., what is and is not an alternative search service that is substantially similar to Google). *E.g.*, JX0091 at -748 (§ 1.65) (AT&T RSA (2021)) (giving Google "sole discretion" to determine what qualifies as a "Search Access Point"); JX0093 at -489, -494 (§§ 1.5, 1.67) (Verizon RSA (2021)) (giving Google "reasonable discretion" to determine what qualifies as a "Alternative Search Service" or "Search Access Point"); JX0095 at -689, -694 (§§ 1.3, 1.66) (T-Mobile RSA (2021)) (giving Google "reasonable discretion" to determine what qualifies as a "Alternative Search Service" or "Search Access Point"); JX0062 at -177, -182 (§§ 1.7, 1.81) (Motorola MIA (2020)) (giving Google "sole discretion" to determine what qualifies as a "Alternative Search Service" or "Search Access Point"). This gives Google control of the coverage and breadth of its exclusive contracts. Des. Tr. 124:8–125:6 (Christensen (Motorola) Dep.). Google acknowledges that there is ambiguity in what constitutes an alternative search service and that "[t]here is no formal guidance or similar document specifying what falls within the definition." UPX6030 at -622 (written 30(b)(6) response: Consideration of what constitutes an "alternative search service" "involves the input of a number of individuals at Google" and "[t]here is no fixed or final arbiter for this question.").

264. Throughout the period covered by the complaint, RSAs have come in three flavors:

> (1) *platform wide*: all Android devices the distributor sells must meet the requirements for the distributor to receive any payments from Google,
>
> (2) *device-by-device*: the distributor can choose to configure a device to meet the RSA requirements—if the device meets the requirements the distributor can

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JX0095 at -689 (§ 1.3) (T-Mobile RSA (2021)) ("'Alternative Search Service' means any search service that is substantially similar to Google Search (as determined by Google in its reasonable discretion)"); JX0062 at -177 (§ 1.7) (Motorola MIA (2020)) ("'Alternative Search Service' means any search service that is substantially similar to Google Search (as determined by Google in its sole discretion)").

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receive payments for searches on that device, regardless of whether other devices meet the RSA requirements or not, or

(3) *both*: an RSA may have one tier with certain requirements that are platform wide and entitle the distributor to some payments and a second tier with additional requirements that the distributor can choose to meet on a device-by-device basis to earn additional payments.

Compare JX0091 at -749 (§ 2.2) (AT&T RSA (2021)) (containing only a device-by-device Preferred Tier for new devices) *with* JX0093 at -496 (§§ 2.2, 2.3) (Verizon RSA (2021)) (containing both a platform-wide Core Tier and a device-by-device Preferred Tier for new devices) *and* JX0047 at -295 (§ 2.1) (T-Mobile RSA (2017)) (containing a single platform-wide tier for new device with Google apps); Tr. 823:9–824:15 (Kolotouros (Google)) (device by device means that if a particular device meets the RSA's conditions, the partner could receive revenue share for that device; a platform-wide RSA means that "all devices must be enrolled in the deal" to earn revenue share).

265. In the context of negotiating Samsung's RSA, Google referred to "search defaults on all access points" and "search exclusivity on a device-by-device basis" as "[t]raditional [RSA] commitments." UPX1108 at -811.

266. In addition to search-related requirements, more recent RSAs may also include letter-upgrade and security-update requirements (the Samsung RSA (2020) has no such requirements). *E.g.*, JX0093 at -502 (§ 5.4) (Verizon RSA (2021)); JX0095 at -699–700 (§ 4.6) (T-Mobile RSA (2021)); JX0091 at -753 (§ 4.4) (AT&T RSA (2021)); JX0062 at -185–86 (§§ 4.4, 4.5) (Motorola MIA (2020)).

267. Generally, only one partner can earn revenue share on a particular Android mobile device: the OEM or the Carrier. UPX0294 at .010 ("Since we sign RSAs with both, we track revenue sharing through the unique Client ID set on each phone. This can only go to one partner, OEMs and carriers fight for ownership."). In the United States, the majority of RSA

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payments are made to carriers. Tr. 9446:16–22 (Rosenberg (Google)); UPX0294 at .010 ("In practice, it tends to go to whichever type of partner is the main smartphone distribution channel in a given market (in more developed markets, this tends to be carriers).").

268. Google's RSAs with carriers cover Android devices that carriers sell to consumers. Tr. 940:25–942:4 (Kolotouros (Google)). Google's RSAs with OEMs cover the smaller portion of Android devices that OEMs sell directly to U.S. consumers. *Id.* (Android devices sold to consumers by Samsung and Motorola (as opposed to carriers) are covered by their respective RSAs). One exception to this general rule is that, even on carrier-sold devices, Samsung earns [redacted]% revenue share from default queries on Chrome, if Chrome is in the hot seat and the default browser. JX0071 at -404, -416–17, -424 (§ 7, Attachment A, Attachment C-2) (Samsung RSA (2020)).

i. Google Has RSAs With All Major U.S. Carriers

269. Google offers revenue share to carriers only for devices built in compliance with the MADA preinstallation and placement requirements. JX0093 at -490–91, -494 (§§ 1.12, 1.18, 1.23, 1.58) (Verizon RSA (2021)) (for a carrier to earn revenue share on an Android device it must have been manufactured by an OEM with a MADA); JX0095 at -689–90, -693 (§§ 1.7, 1.10, 1.19, 1.55) (T-Mobile RSA (2021)) (same); JX0091 at -744–45, -747 (§§ 1.13, 1.26, 1.56) (AT&T RSA (2021)) (same); Tr. 1516:24–1517:10 (Yoo (Google)) (Although carriers do not sign MADAs, the devices carriers sell are subject to the MADAs of the OEMs that manufacture the devices.).

270. Even if carriers do not sign an RSA, the Android devices they sell are still bound by the terms of the OEM's MADA if Google apps are preinstalled. *Supra* ¶ 252; UPX6027 at -564 (written 30(b)(6) response: "[I]f an Android OEM chooses to preload the Google proprietary applications that Google distributes through the MADA, including on devices that

[redacted]

OEMs build for U.S. carriers, the OEM must comply with the terms of the MADA, subject to Google granting a waiver.").

271. The most recent set of carrier RSAs were signed in 2021. JX0091 (AT&T RSA (2021)); JX0093 (Verizon RSA (2021)); JX0095 (T-Mobile RSA (2021)).

(a) The AT&T RSA Ensures Google Is The Exclusive Default Search

272. The AT&T RSA has ensured that Google is the exclusive search default on AT&T Android smartphones since 2011. JX0015 (AT&T RSA (2011)). In exchange for revenue share payments, AT&T agrees to make Google the default search on all search access points (e.g., AT&T agrees to set Google as the default search on all preinstalled browsers, including S Browser) and place the Google Search Widget on the default home screen. JX0091 at -751 (§ 4.1), -766–68 (Attachment B) (AT&T RSA (2021)); UPX1024 at -294 ("Search agreements are mechanisms to tie rev share to exclusivity."). AT&T is prohibited from preinstalling any rival GSE or setting any rival GSE as the default on any search access point. JX0091 at -752 (§ 4.2) (AT&T RSA (2021)).

273. The current RSA, signed in 2021, has only one revenue share tier for new devices. JX0091 at -751 (§ 4.1) (AT&T RSA (2021)). AT&T may choose on a device-by-device basis to enroll devices in the RSA and earn [redacted]% revenue share on user searches conducted through enumerated search access points. JX0091 at -751 (§ 4.1), -765 (Attachment A, § 1(a)) (AT&T RSA (2021)). The 2021 RSA also entitles AT&T to [redacted]% of Search Ad revenue on search access points on old devices that continue to comply with the 2018 RSA. JX0091 at -765 (Attachment A, § 1(b)) (AT&T RSA (2021)). AT&T enrolls virtually all its Android smartphones in the RSA. Des. Tr. 193:5–14, 194:19–21, 195:3–6 (Ezell (AT&T) Dep.) (unaware of AT&T opting any Android phones out of the RSA and there are no plans to do so in the

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future); Des. Tr. 177:17–20, 177:23–178:2 (Levine (Google) Dep.) (unaware of any AT&T devices excluded from being RSA qualified devices circa 2018).

274. The 2021 RSA has a three-year term. JX0091 at -741 (AT&T RSA (2021)). AT&T may only terminate the RSA if Google breaches the contract. JX0091 at -758–59 (§ 10.2) (AT&T RSA (2021)).

275. Before 2021, the 2018 AT&T RSA controlled. It was also one tier and device-by-device. JX0050 at -008 (§ 2.1) (AT&T RSA (2018)). In exchange for revenue share from Google, AT&T agreed to make Google the out-of-the-box default on all search access points and AT&T was prohibited from implementing rival GSEs on any Android device it enrolled in the RSA. JX0050 at -008 (§ 2.1), -009–10 (§ 2.4), -024–25 (Exhibit B) (AT&T RSA (2018)).

(b) The Verizon RSA Ensures Google Is The Exclusive Default Search

276. Verizon's RSA has ensured that Google is the exclusive default search engine on Verizon devices since 2011. JX0016 at -678 (§ 12) (Verizon RSA (2011 amend.)). The current Verizon RSA, signed in 2021, has two revenue-share tiers for new devices. JX0093 at -496 (§§ 2.2, 2.3) (Verizon RSA (2021)). If Verizon wants to earn any revenue share from Google on any Verizon device, all of its Android devices must meet the Core Tier requirements. JX0093 at -496 (§ 2.2) (Verizon RSA (2021)). The Core Tier requires Verizon to set Google as the default search engine in either Chrome or Samsung's S Browser and place that browser in the hot seat on every device sold by Verizon. JX0093 at -498–99 (§§ 4.1, 4.2), -516 (Attachment B) (Verizon RSA (2021)). If Verizon enrolls a device in the Core Tier, Verizon earns [redacted]% of net Search Ad revenue on the enumerated search access points. JX0093 at -515 (Attachment A, § 1(a)) (Verizon RSA (2021)).

277. Verizon may earn additional revenue share by enrolling a device in the Preferred Tier, which requires Verizon to make Google the default search on all search access points (e.g.,

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Verizon agrees to set Google as the default search on all preinstalled browsers), place the Google Search Widget on the default home screen, and set Chrome (not S Browser) as the default browser and place it in the hot seat. JX0093 at -496 (§ 2.3), -499–500 (§ 5.1), -517–18 (Attachment C) (Verizon RSA (2021)); Tr. 1027:15–19 (Higgins (Verizon)) (The hot seat is "generally considered to be preferred because . . . it's on the home screen and it's persistent across the other screens as well.").

278. In the Preferred Tier, Verizon is prohibited from preinstalling any rival GSE or setting any rival GSE as the default on any search access point. JX0093 at -500–01 (§ 5.2) (Verizon RSA (2021)); Tr. 9327:2–19 (McCallister (Google)) (Google expects a carrier partner to whom Google is paying at the highest revenue share to work on "promotional exclusivity" and should not be "promoting a rival search engine at the same time"). If Verizon enrolls a device in the Preferred Tier, Verizon earns [redacted]% of net Search Ad revenue on the enumerated search access points. JX0093 at -515 (Attachment A, § 1(b)) (Verizon RSA (2021)). Verizon enrolls all its Android smartphones in the Preferred Tier. Tr. 1050:18–22 (Higgins (Verizon)) ("The new devices that we sold, I believe, all of them would have been at the [redacted] percent tier.").

279. Verizon secured a limited carveout in the Preferred Tier that allowed Verizon to preinstall the Yahoo Mobile App, which has search capability, as long as Verizon owned Yahoo, placed the app on the plus one screen (not the home screen), and Verizon made sure the app "didn't allow a punch-out into general search." Tr. 1094:19–1095:15 (Higgins (Verizon)); JX0093 at -500 (§ 5.2) (Verizon RSA (2021)). Verizon sold Yahoo in May 2021, before executing the RSA, making the carveout ineffectual. Tr. 1072:11–13 (Higgins (Verizon)).

280. The 2021 RSA also entitles Verizon to [redacted]% of net Search Ad revenue on search access points on old devices that continue to comply with the 2014 amendment to Verizon's

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2009 RSA (2014 RSA). JX0093 at -496 (§ 2.4), -515 (Attachment A, § 1(c)) (Verizon RSA (2021)).

281. The 2021 RSA has a two-year term. JX0093 at -487 (Verizon RSA (2021)). Verizon may only terminate the RSA if Google breaches the contract. JX0093 at -508 (§ 11.2) (Verizon RSA (2021)).

282. Before 2021, Verizon's 2014 RSA controlled. It had one revenue tier and was platform wide. JX0026 at -277 (Exhibit 8, § 2(b)), -280 (Exhibit 8, § 3(c)) (Verizon RSA (2014 amend.)); Des. Tr. 233:17–234:7, 234:11–236:10 (Levine (Google) Dep.) (Verizon's RSA in place at the time she joined Google's North American carrier group was a platform deal). In exchange for revenue share from Google, Verizon agreed to set Google as the default search on preinstalled browsers and place the Google Search Widget on the default home screen. JX0026 at -278–79 (Exhibit 8, § 2(l)), -280 (Exhibit 8, § 3(c)) (Verizon RSA (2014 amend.)).

283. Due to a drafting error, Verizon's 2014 RSA did not explicitly prohibit the carrier from preinstalling rival GSEs. Tr. 9356:24–9357:12 (McCallister (Google)) ([A]fter Google realized that the exclusivity provision was struck inadvertently in the previous agreement, Google "precipitated the renegotiations of the RSA."); Des. Tr. 233:17–234:7, 234:11–236:16, 236:20–238:1, 238:8–240:6, 241:17–242:14 (Levine (Google) Dep.) (Google discovered Verizon was not technically obligated to grant search exclusivity under the 2014 RSA due to a drafting error.); Des. Tr. 237:11–238:1, 238:8–10 (Levine (Google) Dep.) ([T]he drafting error removing search exclusivity was particularly egregious because "[m]ost of the value in the prior [Verizon RSA] agreement was coming from exclusivity."); UPX2093 at -398 ("[I]n previous amendments . . . the exclusivity provision was removed (!!) so we are paying Verizon [redacted]% for basically nothing right now. . . . [T]he highest priority is resecuring exclusivity.").

[redacted]

(c) The T-Mobile RSA Ensures Google Is The Exclusive Default Search

284. T-Mobile's RSA has ensured that Google is the exclusive default search engine on T-Mobile devices since 2009. JX0011 at -180 (§ 2.1) ((T-Mobile RSA (2009)). In exchange for revenue share payments, T-Mobile agrees to make Google the default search on all search access points (e.g., T-Mobile agrees to set Google as the default search on all preinstalled browsers, including S Browser), make Chrome the default browser and place it in the hot seat, and place the Google Search Widget on the default home screen. JX0095 at -696, -697–98 (§§ 4.1, 4.3), -712–13 (Attachment A) (T-Mobile RSA (2021)). T-Mobile is also prohibited from preinstalling any rival GSE or setting any rival GSE as the default on any search access point. JX0095 at -696–97 (§ 4.2) (T-Mobile RSA (2021)).

285. The 2021 T-Mobile RSA has only one payment tier for new devices. JX0095 at -695 (§ 2.2) (T-Mobile RSA (2021)). T-Mobile may choose on a device-by-device basis to enroll devices in the RSA, which then pays $[redacted] per device per month for those enrolled devices. JX0095 at -692 (§ 1.50), -695 (§ 2.2), -702–03 (§ 9.1) (T-Mobile RSA (2021)). The 2021 RSA also entitles T-Mobile to $[redacted] per device per month for old devices that continue to comply with the 2017 RSA. JX0095 at -692 (§ 1.50), JX0095 at -695 (§ 2.3), -702–03 (§ 9.1) (T-Mobile RSA (2021)); Des. Tr. 201:17–203:9 (Giard (T-Mobile) Dep.) (describing the structure of the 2021 T-Mobile RSA, which pays T-Mobile for each conforming Android device it sells). T-Mobile enrolls virtually all its Android smartphones in the RSA. Des. Tr. 195:1–20 (Giard (T-Mobile) Dep.) (As of January 2022, all T-Mobile devices conformed with the RSA and T-Mobile had no plans to launch any non-conforming devices.).

[redacted]

286. The 2021 RSA has a three-year term. JX0095 at -687 (T-Mobile RSA (2021)). T-Mobile may only terminate the RSA if Google breaches the contract. JX0095 at -704 (§ 10.2) (T-Mobile RSA (2021)).

287. Before 2021, the 2017 RSA controlled. It had one revenue-share tier and required platform-wide compliance. JX0047 at -295 (§ 2.1) (T-Mobile RSA (2017)). In exchange for revenue share from Google, T-Mobile agreed to make Google the out-of-the-box default on all search access points and was prohibited from implementing rival general search services on every Android device. JX0047 at -295 (§ 2.1), -297–98 (§ 2.4), -314–15 (Exhibit B) (T-Mobile RSA (2017)); UPX0287 at -409 (summarizing the new RSA terms that Google was proposing to T-Mobile in 2017).

288. T-Mobile acquired Sprint in April 2020. UPX5545 at -480 (Sprint RSA (2020 amend.)). Sprint's 2017 RSA followed the same structure as T-Mobile's 2017 RSA. *Compare* JX0047 (T-Mobile RSA (2017)) *with* UPX5536 (Sprint RSA (2017)). Sprint has had an RSA with Google since 2008. UPX5533 (Sprint RSA (2008)).

ii. Carrier Mobile Services Incentive Agreements (MSIAs)

289. In 2021, each carrier entered into mobile services incentive agreements (MSIAs) with Google; these are sometimes referred to as go-to-market agreements. JX0092 (AT&T MSIA (2021)); JX0096 (T-Mobile MSIA (2021)); JX0094 (Verizon MSIA (2021)); Tr. 9460:24–9461:23 (Rosenberg (Google)). Under the MSIAs, carriers earn additional payments on Android devices they sell in exchange for meeting various non-search related requirements. JX0092 at -778 (AT&T MSIA (2021)); JX0096 at -721 (T-Mobile MSIA (2021)); JX0094 at -530 (Verizon MSIA (2021)).

290. The MSIAs and RSAs were not contingent on each other—a carrier did not have to sign an RSA to sign an MSIA and vice versa. Tr. 9376:21–9377:8 (McCallister (Google)).

[redacted]

Unlike the RSAs, the MSIAs did not require the carriers to preinstall Google Search or set Google Search as the default. *Id*. 9377:15–9378:2. During the RSA renegotiations in 2020 and 2021, Google sometimes referred to the RSAs as "Deal 1" and the MSIAs as "Deal 2." UPX2097 at -742.

291. Google designed the MSIAs and associated payments to support the sale of Android devices. Tr. 9378:23–9379:1 (McCallister (Google)); Tr. 9460:24–9461:23 (Rosenberg (Google)) (MSIAs redirected investment toward specific go-to-market activities aimed at helping Android compete against iOS.); UPX2097 at -742 (Deal 2 payments needed "to incentivize Android device share"). To that end, the MSIAs require the carriers and Google to collaborate on how MSIA payments will be spent to support Android. JX0092 at -784–86 (§ 5) (AT&T MSIA (2021)); JX0096 at -726–28 (§ 4) (T-Mobile MSIA (2021)); JX0094 at -536–37 (§ 5) (Verizon MSIA (2021)); Tr. 9460:24–9461:23 (Rosenberg (Google)).

iii. Google Has RSAs With All Major Android OEMs

292. Google offers revenue share to Android OEMs only if they are MADA licensees. Tr. 1516:24–1517:10 (Yoo (Google)) (when OEMs sell Android devices pursuant to their RSAs, the devices are also subject to a MADA); Tr. 777:12–15 (Kolotouros (Google)) (could not identify any Android OEM with an RSA but not a MADA); *id*. 778:2–6 ("[T]he RSA generally does not happen unless an OEM has entered into a MADA."); Des. Tr. 99:18–25, 101:4–8 (Christensen (Motorola) Dep.) (to earn revenue share, Motorola must have, and be incompliance with, a MADA); JX0062 at -189 (§ 7.1) (Motorola MIA (2020)); JX0071 at -406 (§ 10.1) (Samsung RSA (2020)).

293. The most recent set of Android OEM RSAs were signed in 2020. JX0071 (Samsung RSA (2020)); UPX5399 (Motorola MIA (2020)).

[redacted]

(a) The Samsung RSA Ensures Google Is The Exclusive Default Search

294. The Samsung RSA has ensured that Google is the exclusive default search engine on Samsung devices since 2011. JX0014 at -933 (§ 12) ((Samsung RSA (2011)). In 2020, Jim Kolotouros, VP of Android Platform Partnerships, referred to the Samsung RSA as the [redacted] UPX0900 at -139.

295. Samsung's 2020 RSA has two revenue-share tiers for new devices it sells to U.S. consumers. JX0071 at -399 (§§ 2.1, 2.2) (Samsung RSA (2020)). If Samsung wants to earn any revenue share from Google, Samsung must configure all its Android devices to meet the Core Tier requirements. JX0071 at -399 (§ 2.1) (Samsung RSA (2020)); Tr. 3237:8–3238:17 (Tinter (Microsoft)) (Samsung was not willing to enter into a partnership with Microsoft using Bing because that would affect the Google MADA and put Samsung at risk.); *id.* (Tinter counseled his team that any deal with Samsung would have to have Chrome on the device set to Google as a default so as not "to make Google mad."); UPX0164 at -579 (In an email discussing a possible Microsoft deal, Samsung stated that "[r]eplacing Google Search with Bing would not only violate [Samsung's] Google contract but it will highly impact rev share (Rev share that we get from Google on Search is huge . . .).").

296. The Core Tier requires, among other things, that Samsung set Google as the default search on S Browser. JX0071 at -401 (§ 4.1), -419–20 (Attachment B-1) (Samsung RSA (2020)). The restrictions on S Browser in the Core Tier are very specific. For example, Samsung's S Browser can include rival GSEs in the address bar drop-down menu, but if a user selects a rival GSE from that menu, the action cannot change the default, i.e., that rival GSE will only be used for that single search, the default search in the address bar the next time the user runs a search will remain Google. JX0071 at -426–28 (Attachment E) (Samsung RSA (2020));

[redacted]

Tr. 885:19–888:2 (Kolotouros (Google)) (Samsung violated its 2017 RSA when a user selected a rival GSE from the drop-down menu and that selection changed the default search for S Browser's address bar.). In the Core Tier, Samsung earns [redacted]% of net Search Ad revenue from S Browser default searches. JX0071 at -416 (Attachment A, § 1(a)) (Samsung RSA (2020)).

297. Samsung can earn additional revenue share by enrolling a device in the Enhanced Tier. JX0071 at -399 (§ 2.2) (Samsung RSA (2020)). Samsung may choose to make Enhanced Tier devices (i) Search Enhanced, which requires setting the Google Search Widget and GSA pursuant to the MADA and setting all search intents and all relevant preinstalled apps or services to GSA, (ii) Chrome Enhanced, which requires setting Chrome as the default browser and placing it in the hot seat, or (iii) Search and Chrome Enhanced. JX0071 at -402 (§ 5.1), -422–24 (Attachments C-1 & C-2) (Samsung RSA (2020)).

298. If Samsung enrolls a device in the Enhanced Tier, it earns [redacted]% of net Search Ad revenue on those additional search access points Samsung configures to meet the Enhanced Tier requirements. JX0071 at -402–03 (§ 5.1), -416 (Attachment A, § 1(b)) (Samsung RSA (2020)). On devices Samsung sells to carriers—i.e., devices covered by the carriers' RSA and for which Samsung would not otherwise earn any revenue share—Samsung can earn [redacted]% of net Search Ad revenue derived from default Chrome searches, if Chrome is preinstalled as the default browser and placed on the hot seat. JX0071 at -404 (§ 7.1), -416 (Attachment A, § 1(c)) (Samsung RSA (2020)). The 2020 RSA also entitles Samsung to [redacted]% revenue share for old devices that continue to comply with the 2017 RSA. JX0071 at -404 (§ 6.1), -417 (Attachment A, § 1(d)) (Samsung RSA (2020)).

299. Samsung enrolls virtually all the Android smartphones it sells to consumers in the Search and Chrome Enhanced Tier, which requires search exclusivity. Tr. 920:24–921:11,

[redacted]

923:25–924:9 (Kolotouros (Google)) (stating that "most, if not all, [Samsung sold Android devices] are going to be enrolled in the Search and Chrome enhanced [tier]" and subject to search exclusivity out of the box); UPX0166 at -544 (Google pays aggressively for S Browser search defaults and putting Chrome in the hot seat.).

300. Samsung's 2020 RSA has a four-year term. JX0071 at -392 (Samsung RSA (2020)). Samsung may only terminate the RSA if Google breaches the contract. JX0071 at -409–10 (§ 14.2) (Samsung RSA (2020)).

301. Before 2020, the 2017 RSA controlled. It had one revenue-share tier and was device-by-device. JX0041 at -971–72 (§ 2.1) (Samsung RSA (2017)). In exchange for revenue share from Google, Samsung agreed to make Google the out-of-the-box default on all search access points and was prohibited from implementing rival GSEs on any Android device Samsung enrolled in the RSA. JX0041 at -971–72 (§ 2.1), -975–76 (§ 2.5), -987–88 (Exhibit B) (Samsung RSA (2017)).

(b) Samsung Signed Two Additional Agreements With Google In 2020

302. When Samsung signed the RSA with Google in 2020, Samsung simultaneously signed two additional agreements: (1) the Mobile Services Incentive Agreement (MSIA), and (2) Go To Market Incentive Payments Pool Agreement (GTM Agreement). JX0072 (Samsung MSIA (2020)); JX0075 (Samsung GTM Agreement (2020)); UPX0786 (summarizing the three 2020 deals). The MSIA makes Samsung eligible for additional payments if Samsung meets certain requirements, including those relating to Google's messaging app and a Google Minus One Screen experience on devices. JX0072 at -239 (Samsung MSIA (2020)).

303. For Samsung, security update and letter grade requirements are contained in the GTM agreement rather than the RSA. JX0075 at -368–69 (§ 4) (Samsung GTM Agreement) (2020)). The GTM agreement is also aimed at "promot[ing] sales of [Samsung's] Android

[redacted]

phones and tablets," and makes Samsung eligible for additional payments for each Android device Samsung sells to carriers or consumers in certain territories, including the United States, that meets a variety of requirements. JX0075 at -365 (Samsung GTM Agreement (2020)). The GTM agreement requires devices sold in the United States be configured to meet the RSA's Enhanced Tier, which requires search exclusivity. JX0075 at -368 (§ 3.1 (c)) (Samsung GTM Agreement) (2020)). If the consumer buying the Android device was switching to Android from iOS, Samsung receives larger payments. JX0075 at -381 (Attachment A) (Samsung GTM Agreement (2020)).

(c) The Motorola RSA Ensures Google Is The Exclusive Default Search

304. The Motorola RSA has ensured that Google is the exclusive default search engine on Motorola devices since 2005. JX0003 at -158–59 (§ 4), -160 (§ 6) (Motorola RSA (2005)). The 2020 Motorola RSA (also referred to as the Mobile Incentive Agreement or MIA) has two payment tiers for new devices Motorola sells to U.S. consumers. JX0062[11] at -183 (§ 2.1) (Motorola MIA (2020)). If Motorola wants to receive any payments from Google, the OEM must configure *all* its Android devices to at least meet the Foundation Tier requirements. JX0062 at -183 (§ 2.1) (Motorola MIA (2020)). Among other things, the Foundation Tier requires Motorola to set Chrome (with Google set as the default GSE) as the default browser and place it in the hot seat. JX0062 at -178 (§§ 1.21, 1.22), -184–85 (§§ 4.1, 4.3) (Motorola MIA (2020)).. In the Foundation Tier, Motorola earns at least $[redacted] per month, with additional payments if it meets certain upgrade and security metrics. JX0062 at -197–98 (Attachment A, § 1) (Motorola MIA (2020)).

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[11] UPX5399 is a duplicate of JX0062. UPX5399 was produced by Motorola and JX0062 by Google. Both are in evidence.

[redacted]

305. Motorola can earn additional payments by enrolling a device in the Premier Tier, which requires Motorola to make Google the default search on all search access points (e.g., Motorola agrees to set Google as the default search on all preinstalled browsers) and place the Google Search Widget on the default home screen. JX0062 at -183 (§ 2.1), -186–87 (§ 5.1), -201 (Attachment B) (Motorola MIA (2020)). In the Premier Tier, Motorola is prohibited from preinstalling any rival GSE or setting any rival GSE as the default on any search access point. JX0062 at -177 (§ 1.7), -185 (§ 4.3), -186–87 (§ 5.1) (Motorola MIA (2020)).

306. The prohibition on implementing rival GSEs on devices was originally part of the Foundation Tier, but Google removed that obligation from the Foundation Tier in August 2020, during the Department of Justice's investigation of Google's exclusionary conduct and two months before the complaint was filed in this matter. UPX5401 at -016 (Google unilaterally informing Motorola that the prohibition on alternative search services in MIA § 4.3 will no longer apply in the Foundation Tier); ECF No. 1 (DOJ Complaint) (filed Oct. 20, 2020).

307. If Motorola enrolls a device in the Premier Tier, the company receives significant additional monthly payments from Google. JX0062 at -198–200 (Attachment A, § 2) (Motorola MIA (2020)). Virtually all the Android smartphones Motorola sells to consumers are enrolled in the Premier Tier, which requires search exclusivity. Tr. 911:11–912:3, 924:10–14 (Kolotouros (Google)) (More than 95% of Motorola Android devices sold to U.S. consumers meet the Premier Tier's search exclusivity requirement).

308. The 2020 RSA has a two-year term. JX0062 at -175 (Motorola MIA (2020)). Motorola may only terminate the RSA if Google breaches the contract. JX0062 at -192 (§ 12.2) (Motorola MIA (2020)).

[redacted]

309. Before 2020, the 2017 Motorola RSA controlled. It had one revenue-share tier and provided compensation device-by-device. JX0039 at -799 (§ 2.1) (Motorola RSA (2017)). In exchange for revenue share from Google, in 2017 Motorola agreed to make Google the out-of-the-box default on all search access points and was prohibited from implementing rival GSEs on any Android device Motorola sold to consumers. JX0039 at -799 (§ 2.1), -800–01 (§ 2.4), -810 (Exhibit B) (Motorola RSA (2017)).

3. Revenue Share Agreements With Third Party Browsers

310. Google also secures itself as the default search engine in the only meaningful third-party browsers by paying hundreds of millions of dollars each year. Des. Tr. 190:12–17, 190:21–191:2, 191:5–10 (Baker (Mozilla) Dep.) (Google pays "hundreds of millions of dollars a year" to Mozilla to be Firefox's nearly worldwide default search engine.); UPX6024 at -436 (written 30(b)(6) response: "Google's current RSA agreement with Mozilla provides for Google to be the default search provider on Mozilla's Firefox browser.").

a) Google Has An Exclusive Default Search Agreement With Mozilla Firefox

311. Google's contract with Mozilla—which owns Firefox, the largest third-party browser—requires Mozilla to exclusively preset Google as the default search engine for all the browser's search access points, including all search boxes within the browser frame, the navigation bar, all search boxes displayed on a default homepage and new tab page, and right-click search functionality. JX0031 at -615 (§ 1), -616–17 (§ 2.1(a)) (Mozilla SA (2016)) (establishing default terms applicable outside the United States); JX0048 at -775 (§ 1) (Mozilla SA (2017 amend.)) (extending the terms of JX0031 to the United States). Under Mozilla's default search agreement, the company receives [redacted]% of Google's gross Search Ad revenue from Firefox. JX0048 at -775–76 (§ 2.1(b)) (Mozilla SA (2017 amend.)).

[redacted]

312. Google's search revenue share accounts for a substantial majority of Mozilla's revenue—80% of Mozilla's revenue comes from its revenue sharing agreement with Google. Des. Tr. 41:18–24 (Baker (Mozilla) Dep.).

313. Google first contracted with Mozilla in 2004 to set Google Search as the Firefox default. UPX5434 at -126–27 (§ 2.4) (Mozilla SA (2004)). Over the following decade, the agreement was amended many times, all while preserving the default requirement from the original agreement. UPX5435 (Mozilla SA (2005 amend.)); UPX5436 (Mozilla SA (2005 amend.)); UPX5437 (Mozilla SA (2006 amend.)); UPX5438 (Mozilla SA (2008 amend.)); JX0018 (Mozilla SA (2011 amend.)).

314. In 2014, Mozilla changed the default GSE in Firefox from Google to Yahoo. Des. Tr. 69:22–70:3 (Baker (Mozilla)) Dep.). Mozilla's bet did not pay off. After becoming the Firefox default, Yahoo responded to the deal's financial pressure by loading its page with ads and degrading the user experience. *Infra* ¶ 1261. Yahoo no longer represented a viable option for Mozilla, and Mozilla returned to Google. Des. Tr. 79:2–14, 271:18–272:2 (Baker (Mozilla)) Dep.).

315. Accordingly, in 2017, Google again began requiring Mozilla to set the Firefox default search engine to Google Search. JX0031 at -615 (§ 1), -616–17 (§ 2.1(a)) (Mozilla SA (2016)) (establishing default terms then-inapplicable to the United States); JX0048 at -775 (§ 1) (Mozilla SA (2017 amend.)) (extending the terms of JX0031 to the United States). In the years since, Google has amended the agreement while preserving the default requirement. JX0065 (Mozilla SA (2020 amend.)).

[redacted]

b) Google Has Exclusive Default Distribution Agreements With Opera And Other Small Third-Party Browsers

316. Several additional software companies develop web browsers available to users in the United States. Those include Opera Limited (Opera), which develops the Opera browser; and UCWeb Inc. (UCWeb), which develops the UC browser.

317. Google has had an exclusive default search agreement with Opera since 2012, under which Opera's browser must default to Google for all search access points (with limited exceptions). UPX5131 at -939 (§ 2) (Opera DA (2012)). Google and Opera have agreed on at least 15 amendments since the initial signing (usually well before the termination of the agreement), with each amendment containing substantially the same requirement that Google serve as the default search service.[12] Google entered its most recent extension of the default search agreement with Opera in December 2021. UPX5146 (Opera DA (2021 amend.)). The agreement has a [redacted]. UPX5146 at -372 (§ 9.1) (Opera DA (2021 amend.)). Opera's current revenue share rate is [redacted]. UPX5146 at -386–91 (§§ 6–7) (Opera DA (2021 amend.)).

318. Google has had a similarly exclusive contract with UCWeb regarding its browser, UC Browser, since as early as April 1, 2017, and continuing through today. UPX5210 at -849–50

[12] UPX5132 (Opera DA (2013 amend.)); UPX5133 at -727–28 (§ 2) (Opera DA (2013 amend.)); UPX5134 (Opera DA (2013 amend.)); UPX5135 (Opera DA (2013 amend.)); UPX5136 (Opera DA (2013 amend.)); UPX5137 (Opera DA (2014 amend.)); UPX5138 (Opera DA (2014 amend.)); UPX5139 (Opera DA (2015 amend.)); UPX5140 (Opera DA (2015 amend.)); UPX5141 at -568 (§ 2) (Opera DA (2017 amend.)); UPX5142 (Opera DA (2018 amend.)); UPX5143 (Opera DA (2019 amend.)); UPX5144 (Opera DA (2020 amend.)); UPX5145 (Opera DA (2020 amend.)); UPX5146 at -384 (§ 2) (Opera DA (2021 amend.)).

[redacted]

(§ 2.1) (UCWeb SA (2017)); UPX5211 at -881–82 (§ 2.1) (UCWeb SA (2018)); UPX5212 at -810–11 (§ 2.1) (UCWeb SA (2020)); UPX5213 (UCWeb SA (2020 amend.)); UPX5214 (UCWeb SA (2021 amend.)). The most recent term of the agreement was [redacted]. UPX5212 at -819 (§ 11.1) (UCWeb SA (2020)).

4. Google's Search Distribution Agreements Are Profitable

319. Google's search distribution agreements are profitable. Tr. 4773:23–4774:25 (Whinston (Pls. Expert)); Tr. 9785:16–9787:1 (Murphy (Def. Expert)) ("there's a lot of headroom" between what Google pays for defaults and what it would pay).

320. Google refers to the payments that it makes to its search distribution partners to secure defaults as "traffic acquisition costs" or "TAC." Des. Tr. 24:7–10 (Porat (Google) Dep.); *id*. 25:20–22 (agreeing that TAC is "the investment by Google to acquire Search traffic from a partner"); Tr. 1256:24–1257:1 (Dischler (Google)) (agreeing that TAC is "the cost that Google pays its partners in order to receive query traffic").

321. Google determines the profitability of default distribution agreements by measuring the incremental revenue Google would expect to gain from a default relative to the TAC required to secure that default. Tr. 1539:9–1540:9 (Roszak (Google)); Tr. 10049:6–10 (Murphy (Def. Expert)) (when Google offers rev share, it calculates the incremental benefit of defaults to help guide its decision-making); UPX6024 at -437–38 (written 30(b)(6) response: "Prior to entering into these revenue share agreements, Google personnel will often estimate total revenue to be generated from search access points covered by the agreement and the total payments Google expects to make under [the] agreement to the partner."); UPX0551 at -233 (Mr. Pichai stating, "[i]ncremental Searches: This is pretty simple. When we do distribution

[redacted]

deals, the value that is created is if we get ***more searches that we would otherwise have not*** due to the deal.") (emphasis in original).

322. Google has never entered into a default distribution deal where the TAC exceeded the expected incremental revenue. Tr. 1540:19–22 (Roszak (Google)). Ruth Porat, Google's Chief Financial Officer, agrees that "the value of the acquired traffic that Google gets from the TAC payments exceeds [] the cost of the payments that Google makes" and that "[o]therwise [Google] wouldn't make the payments." Des. Tr. 29:19–30:1 (Porat (Google) Dep.); Tr. 10087:12–10088:1 (Murphy (Def. Expert)) (identifying no reason to disagree).

IV. MARKET DEFINITIONS

A. General Search Services In The United States Is A Relevant Market

323. General search services are the services GSEs provide to consumers, allowing consumers to find information from across the internet. Tr. 4610:13–22 (Whinston (Pls. Expert)). The services provided by GSEs are significantly differentiated from other methods of searching for and accessing information, such as by using specialized search engines or social media platforms. *Id*. 4611:6–25. Accordingly, general search services is a relevant antitrust product market in the United States. *Id*. 4610:13–4612:13, 4616:5–25.

1. The Characteristics And Uses Of General Search Services Support Finding A General Search Services Market

324. The characteristics and consumer usage patterns of GSEs indicate that general search services constitute a relevant product market.

a) General Search Services Are Unique In The Breadth Of Queries They Serve

325. General search services are unique in the breadth of the queries they can serve. GSEs seek to return relevant results to any user query, no matter the topic. Tr. 8266:19–25 (Reid (Google)); Tr. 6511:5–23 (Hurst (Expedia Group)). Dr. Mark Israel, Google's economic expert,

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conceded as undisputed that a GSE, "can handle virtually any type of query." Tr. 8708:16–20 (Israel (Def. Expert)).

326. Specialized search engines cannot match the depth and breadth of results that are available on GSEs. Instead, specialized search engines focus on returning queries related to specific information categories, or "verticals." Des. Tr. 181:5–184:16 (Moxley (Google) Dep.) (queries and results on a GSE differ from queries and results on verticals, such as Expedia, Yelp, Nike, and Amazon). For example, a consumer can search "best place with a view in the Caribbean" and expect a result on Google, whereas a travel site like Expedia can only return results if the user provides specific information like "where you're going, what dates you're going, and how many people are going." Tr. 6511:8–23 (Hurst (Expedia Group)); Tr. 4612:14–4614:8, 4617:1–4618:3 (Whinston (Pls. Expert)) (comparing the SERPs of Google and Amazon, you get "a range of kinds of information [for Google] against just of a narrow, come buy something [for Amazon]"); *id*. 6149:11–6150:20 (Google SERP for the query "valentines day gifts" provides information not available on the Amazon SERP); Tr. 8677:25–8678:2 (Israel (Def. Expert)) (Google and Bing return results to a broader set of queries than Amazon).

b) Consumers Use General Search Engines As "One-Stop Shops"

327. Consumers use GSEs as "one-stop shops" to search the internet for answers to a wide range of queries, including non-commercial queries. Tr. 3670:19–23 (Ramaswamy (Neeva)) (GSEs provide a one-stop shop for all information needs.); Des. Tr. 168:20–22, 168:25–170:1 (Moxley (Google) Dep.) (Users prefer a seamless and quick experience to get information quickly.); Tr. 4612:8–13 (Whinston (Pls. Expert)). Indeed, Google's mission statement is "to organize the world's information and make it universally accessible and useful." Tr. 7641:6–20 (Pichai (Google)); Tr. 8224:4–11 (Reid (Google)) ("They [Larry and Sergey] really, really had the desire that you could come here and get any question answered."). As

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Prof. Whinston explained, if consumers did not care about one-stop-shops, then Google would be better off providing vertical search engines. Tr. 10466:1–10467:3 (Whinston (Pls. Expert)).

328. Many consumers begin their search sessions on GSEs. Tr. 3670:6–18 (Ramaswamy (Neeva)) ("[A] general search engine is I guess best defined in contrast to a specialized search engine, which is everything that you are looking for, that's the first place that you can turn to . . . for the vast majority of your information needs."); Tr. 4614:9–4615:16 (Whinston (Pls. Expert)) (77% of consumers on Windows PCs begin their search sessions on GSEs.).

329. Starting a search on a GSE saves consumers the time and mental energy of determining the best place to search. For this reason, a significant volume of searches on Google are "navigational queries," meaning the queries are for the purpose of finding a specific website known to the user. Tr. 8407:15–8410:24 (Israel (Def. Expert)) (defining "navigational queries" as queries on a GSE entered to go to another website); *id.* 8748:19–8749:1 (navigational queries are a significant volume of the searches on GSEs). By contrast, a consumer relying only on specialized search engines may need to type their query in multiple places before finding the best source or the right answer. *Id*. 8716:20–8717:3, 8717:11–23 ("If I don't know the best source, I may have to try various ones. . . . if I don't know, I have to look . . . if I don't know, I have to figure it out.").

330. GSEs allow users to pursue all their different queries in one place. Tr. 4612:14–4614:8 (Whinston (Pls. Expert)) (GSEs provide "a single location for all queries"); Tr. 8674:14–20 (Israel (Def. Expert)) ("GSEs is kind of the Swiss army knife to the browser."). A consumer relying only on specialized search engines may need to navigate to a different search engine for each query. Tr. 10470:8–10472:9 (Whinston (Pls. Expert)) (GSEs reduce consumers' mental

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energy in finding relevant information, especially where users "may just not know about where things are").

331. Google recognizes the value of being a one-stop shop to consumers. Tr. 4612:14–4614:8 (Whinston (Pls. Expert)) (discussing a quote from Marissa Mayer (then-Google executive) on UPXD102 at 7 stating that "Google should be a Swiss Army knife: Clean, simple, the tool you want to take everywhere."). Google's documents recognize that (1) consumers use GSEs for both commercial (monetizable) and non-commercial queries—reflecting the one-stop shop nature of the GSE—and (2) improving its response to non-commercial queries can increase consumer reliance on Google for commercial queries. UPX0334 at -084 (Dr. Varian presentation stating that the general purpose search engine business model is to provide good answers for non-commercial queries so users will use Google for commercial queries)); Tr. 188:14–19 (Varian (Google)) (agreeing that "Google answers non-commercial queries because it hopes, at some point, the user will also type in a commercial query and Google can make money off of it"). For example, one Google presentation regarding how to increase commercial queries and accelerate monetization identified either growing search queries generally—because "commercial queries also increase in a constant proportion"—or by investing in better non-commercial search experiences—because "[i]nvesting in non-commercial verticals spills over into commercial opportunities." UPX0331 at -413, -417.

332. Browsers use GSEs as the default in the address bar because consumers value one-stop shops. Des. Tr. 217:3–8 (Baker (Mozilla) Dep.) (Mozilla set a GSE as the default in the Firefox browser because providing a search engine that does not respond to all different types of user queries would "not be appropriate" and the "user experience" would "not be good");

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Tr. 1032:4–24 (Higgins (Verizon)) (due to user preference, default search engines should be GSEs); Tr. 10468:2–24 (Whinston (Pls. Expert)).

333. Consumers' reliance on these browser defaults, in turn, shows that they value one-stop shops. Tr. 10468:25–10469:16 (Whinston (Pls. Expert)); *id*. 4612:8–4615:16 (discussing UPXD102 at 7); UPX0090 at -940 (users value the convenience and ease of access that the Google default provides on the Safari search bar).

c) Only General Search Engines Are Preset As Default Search Engines

334. Only GSEs are preset as default search engines. Tr. 7425:3–7427:4 (Raghavan (Google)) (TikTok, Facebook, and vertical search providers such as Amazon cannot be default search engines because none are search engines "that do traditional web search."); Tr. 1032:4–24 (Higgins (Verizon)); Tr. 8625:21–8626:4 (Israel (Def. Expert)); Tr. 4622:1–12 (Whinston (Pls. Expert)). Mitchell Baker, CEO of Mozilla, noted that Mozilla would only consider GSEs for the default in the Firefox browser because a vertical provider focused on just one category of content would not be an appropriate default. Des. Tr. 217:9–12, 217:15–23 (Baker (Mozilla) Dep.). Because browser users prefer a GSE as the default, setting a SVP or social network as the default would "not be a good [user] experience." *Id*. 217:24–219:2.

335. In Google's Chrome browser, for example, the list of options a user may select to replace the default search engine includes only GSEs. Tr. 7425:17–20 (Raghavan (Google)).

336. In Safari, Apple only offers users the choice of changing their default search engine from Google to another GSE. Tr. 2169:17–21 (Giannandrea (Apple)); Des. Tr. 82:7–22, 83:13–24 (Apple-EC 30(b)(6) Dep.) (Apple considers "general search functionality" when evaluating which search engines to include as options in Safari). Accordingly, Apple users can only change their Safari default to Yahoo, Bing, DuckDuckGo, or Ecosia. Tr. 2169:17–21 (Giannandrea (Apple)); Des. Tr. 54:25–55:2 (Perica (Apple) Dep.) Apple only allows users to

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select a GSE as the default, rather than a specialized search engine, because users "have an expectation" that a query in the Safari URL bar will return results from a GSE. Tr. 2171:5–13 (Giannandrea (Apple)). Thus, Apple does not—and would not—use Amazon or Facebook as a search default because they cannot support general search functionality. Des. Tr. 89:22–23, 90:2–8, 90:11–12, 90:18–20 (Apple-EC 30(b)(6) Dep.).

d) Choice Screens Offer Choice Among Only General Search Engines To Ensure A Good User Experience

337. The few choice screens for selecting search providers on mobile devices have only offered users choice among GSEs. Choice screens only include GSEs to "ensure a good user experience." UPX8091 at -505; Tr. 7425:17–20 (Raghavan (Google)); Des. Tr. 217:3–8 (Baker (Mozilla) Dep.); Tr. 4622:13–4623:8 (Whinston (Pls Expert)).

338. On Google's Android choice screen in Europe, for example, only GSEs are eligible for inclusion. UPX8091 at -505 (Only "general search services," and not "specialized or 'vertical' providers," are eligible to participate in the EU choice screen to set the Android search default.); Tr. 4622:13–4623:8 (Whinston (Pls. Expert)) (discussing UPXD102 at 18–19 (citing UPX8091 at -505)).

i. Both The Industry And Public Recognize General Search Services Comprise A Relevant Market

339. Industry participants, including Google, browser companies, specialized search companies, and industry analysts, recognize a market for general search services, comprised of GSEs.

e) Google Recognizes General Search Services As Its Own Market And Has Done So For More Than 10 Years

340. In contracts, internal documents, and conduct, Google recognizes that GSEs comprise a relevant general search market; indeed, Google has tracked its market share in that

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market for many years, and does not view specialized search engines as competing for general search queries.

i. Google Has Long Tracked Its Market Share As Compared With Other General Search Engines

341. Google has, for many years, calculated and tracked its market share in the general search services market. Tr. 199:2–202:25 (Varian (Google)) (referring to UPX0902 at -020) (describing four different ways Google used to measure general search share); Des. Tr. 21:25–23:11 (Google-NF 30(b)(6) Dep.) (describing Google's measurement of country-specific general search market share); *id*. 26:23–28:15 (Google developed internal data source to estimate general search market share); *id*. 30:5–31:16 (describing general search market share analysis); UPX0408 at -041, -053 (estimating general search market share); UPX0849 at -619 (same); UPX0348 at -759–60 (2009 general search market shares); UPX0327 at -350–51 (2011); UPX0351 at -775, -777–78 (2017 to 2018).

342. For more than four years, beginning in August 2009, employees at Google sent monthly emails updating Google executives on general search market shares. Tr. 203:21–204:5 (Varian (Google)) (a team led by Penny Chu measured search share monthly). Marissa Mayer, then Google's V.P. of Search Products & User Experience, circulated these general search market figures "[i]n advance of the earnings call and board meeting," describing them as the "latest market share analysis." UPX0499 at -297–98. These email chains show that others within Google recognized that GSEs constitute a relevant market. UPX0499 at -297.

343. As early as 2009, Google concluded that its market share in general search was over 70%. UPX0499 at -297 ("Our numbers paint the following picture of the landscape: Google 71%, Yahoo 17%, Bing 7%").

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344. Between 2017 and 2019, high-level Google executives regularly received quarterly Factpacks, prepared by a team reporting to Ruth Porat, Google's Chief Financial Officer, which included Google's market share in the general search market. Tr. 3702:9–3704:15 (Ramaswamy (Neeva)); UPX0475 at -744 ("User Adoption Metrics" Table from Q2 2018 Factpack showing Google's US "desktop search query share" of 84% and "mobile search query share" of 97%); UPX0476 at -668 (same, with shares of 84% and 98% respectively for desktop and mobile).

345. As recently as July 2021, Google's Chief Business Officer, Philipp Schindler, received these general search market share figures in advance of meetings with Google's Board of Directors. UPX0909 at -167–68 ("BOD Prep for Philipp – Jul 2021" reflecting the User Adoption Metrics Table from Q2 2021, including desktop search query share of 84% and mobile search query share of 97%).

346. Google did not include companies like Amazon or Facebook in its market share calculations even though it had the ability to do so. Tr. 207:16–208:10 (Varian (Google)).

347. When Microsoft's Bing launched in 2009, Google immediately analyzed the effect of Bing's entry on market shares in a market comprising only GSEs. Tr. 3548:4–5 (Nadella (Microsoft)) (Bing launched in 2009); Des. Tr. 18:16–19:22 (Google-NF 30(b)(6) Dep.) (Google analyzed general search market share when Bing first launched); UPX0347 at -370–76 (Google tracked Bing search shares in 2010).

348. Under Mozilla's contract with Google, Mozilla may customize Firefox's navigation bar provided the customization does not involve sending a search query to an "excluded service provider," defined as "Baidu, Bing, DuckDuckGo, Yahoo, and Yandex"

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without forfeiting the Google revenue share. JX0031 at -613, -617 (Mozilla Sponsorship Agreement (2016)).

ii. Google's Chief Economist And General Counsel Recognized That General Search Services Is A Relevant Market

349. Google's chief economist, Dr. Varian, has recognized that general search is a relevant market. Tr. 375:17–376:1 (Google (Varian)) (when describing the loss of competition by going from three to two players in UPX0180, he was describing the loss of competition in the "general search market"); UPX0180 at -451 (email from Dr. Varian stating that a potential deal between Yahoo and Microsoft would create "a loss of competition from going from 3 to 2 players"); UPX0901 at -064 (Hal Varian (Google)) (differentiating "special purpose search engines" such as Amazon and Yelp which focus on "commercial search" from "general purpose search engines like Google, Bing, Baidu, and Yandex"). Indeed, during public talks covering antitrust issues, Dr. Varian has presented materials referring to GSEs as a competitive product category, separate and distinct from specialized search engines, artificial intelligence, and social networks. Tr. 185:20–186:9 (Varian (Google)); UPX0334 at -085 (chart on slide titled "Competition," from presentation by Dr. Varian, identifying "general purpose search engines" as a distinct competitive product category).

350. In 2005, Google's then-chief legal officer David Drummond wrote a letter to Microsoft complaining—in a section titled "Impact on the Market for Search Services"—that Microsoft's use of defaults in Internet Explorer would result in Microsoft "gain[ing] a large number of search users for reasons having nothing to do with the merits of Microsoft's search offering." UPX0172 at -732; Tr. 7680:8–7687:20 (Pichai (Google)) (discussing UPX0172). In that letter, Mr. Drummond described the approach of selecting default options among top general search providers "by market share" as "sensible." UPX0172 at -731.

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iii. Google Recognizes Other General Search Engines As Its Closest Competitors

351. Google's closest competitors are other GSEs. Dr. Varian recognized, "if Google were to disappear, people would just switch to Bing." UPX0340 at -059; Tr. 195:22–196:5 (Varian (Google)) (explaining that in UPX0340 he was considering "in this experiment of eliminating Google, then what would people do"); *id.* 194:7–194:22 (Dr. Varian has a practice of writing in-line responses); Tr. 4623:11–20 (Whinston (Pls. Expert)). Dr. Varian concluded that, without GSEs, the world would look like a "universal library[,] but with no card catalog," suggesting that users could not simply substitute to other types of products to replace the services GSEs provide. Tr. 194:7–196:25 (Varian (Google)) (Dr. Varian has a practice of writing in-line responses).

352. In internal documents, Google identifies other GSEs as its competitors. UPX0278 (detailed presentation titled "Google Search Competitive Factpack" comparing Google Search only to Bing); UPX0408 at -030–45 (Google "Competitive Analysis" identifying "privacy-focus[]ed search engines," namely, DuckDuckGo and Qwant, as Google's only privacy-focused competitors). Google does not view SVPs as competing for general search queries. Tr. 2164:25–2165:14, 2362:23–2363:3 (Giannandrea (Apple)) (when Giannandrea was an executive at Google, from 2010 to 2018, he did not view vertical providers as competing for general search queries); Tr. 8622:21–23 (Israel (Def. Expert)) (Google gets queries that Amazon does not compete for).

iv. Google Analyzes The Quality Of Its General Search Engines As Compared To Other General Search Engines Such As Bing And DuckDuckGo

353. Google analyzes the quality of its GSE as compared with other GSEs. Tr. 8099:14–8100:8 (Gomes (Google)); Tr. 6367:16–24 (Nayak (Google)) (Google compares its

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quality to Bing's); Tr. 8677:18–8678:13 (Israel (Def. Expert)). Google regularly runs analyses to see how its search results and ranking compare, for example, to Microsoft's Bing. Tr. 6466:14–6466:18 (Nayak (Google)) (Google compared itself to Bing in side-by-side analyses); UPX2033 at -000 (Side-by-side analysis comparing Google and Bing's COVID search results); Des. Tr. 175:25–177:25 (Moxley (Google) Dep.) (Google would analyze how its ranking compared to Bing's); 4621:2–12 (Whinston (Pls. Expert)) (commenting on UPX0268 at -182); UPX0268 at -132–33, -182 (presentation showing Google evaluating its search quality against other GSEs.).

354. Google compares its search product with other GSEs across axes of quality such as speed/latency. Tr. 7771:7–25 (Pichai (Google)); Tr. 6457:13–21 (Nayak (Google)) (Google's slower latency than Bing had been raised and Google instituted a response); UPX2022 at -590 (Google comparing its latency with Bing's). Privacy is another area in which Google compares itself to other GSEs. Tr. 4163:12–19 (Juda (Google)) (in UPX0811 at -420 Google compares itself with DuckDuckGo); UPX0811 at -420 (presentation on potential privacy initiatives in which Google compares its privacy offerings with DuckDuckGo's).

355. Google's comparisons with vertical search engines or Facebook are separate analytics for Google's verticals. Tr. 8099:14–8100:8 (Gomes (Google)) (Google compares its IS quality scores against Bing and DuckDuckGo, but not against Amazon or Facebook); UPX0483 at -295 (Google "Competitor Intelligence" document separating analysis for verticals (including Amazon and Booking) from analysis for "traditional Search engines" (including Bing, Yandex, and DuckDuckGo).

v. Google's Distribution Agreements Differentiate Between General Search Engines And Specialized Search

356. Google's distribution agreements differentiate between GSEs and specialized search engines. Google's exclusive agreement with Verizon between 2011 and 2014 defined

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"General Web Search" as "search functionality that produces search results by searching a large proportion of indexable web sites, . . ." and explicitly distinguished, "[f]or clarity, vertical and customizable search functionality . . . is not General Web Search." JX0016 at -678; UPX6026 at -553 (written 30(b)(6) response: "'[G]eneral web search,' meaning services that 'search[] the web for . . . web results to general queries.'" (second set of brackets in original)); UPX6030 at -621 (written 30(b)(6) response: "Examples of such services that deliver search results by searching the Internet in a manner substantially similar to Google Search include Bing and Yahoo Search.").

357. "Alternative Search Service" in Google's contracts "means any search service that is substantially similar to Google Search (as determined by Google in its reasonable discretion)." JX0095 at -689 (§ 1.3) (T-Mobile RSA (2021)); JX0062 at -177 (§ 1.7) (Motorola MIA (2020)). The "Alternative Search Services" prohibited under Google's RSAs do not include specialized search services or social media. Des. Tr. 185:19–25, 186:7–187:14 (Ezell (AT&T) Dep.) (the Facebook and Amazon Shopping apps, as verticals and not general search services, could be preloaded in compliance with the RSA); Tr. 8688:25–8689:9 (Israel (Def. Expert)) (the RSAs prohibit the preinstallation of GSEs like Bing, but do not prohibit the preinstallation of specialized verticals like Amazon and Yelp or social networks like Facebook, Instagram, and TikTok); Des. Tr. 260:20–261:3, 261:5–262:2, 262:5–7 (Levine (Google) Dep.) (the RSA Escalation Council determined the Amazon Shopping app would only be considered an alternative service once it incorporated full Alexa functionality (meaning some access to "general web search"); UPX0567 at -914–15 (RSA Escalation Council meeting notes stating that Amazon App may be preloaded only until it incorporates Alexa functionality, after which it will be treated as an alternative assistant service).

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358. The 2014 Joint Cooperation Agreement (JCA), through which Google and Apple amended the ISA in 2014, recognizes GSEs as comprising a relevant market. UPX6026 at -555 (written 30(b)(6) response: "Google understands 'other general search engine' in the context of the JCA to refer to other general purpose search engines that may be referenced in third-party reporting service market share reports for individual countries."); Des. Tr. 59:25–60:17, 60:19–23, 60:25–61:19, 61:21–23 (Apple-EC 30(b)(6) Dep.); JX0024 at -822 (2014 Apple-Google Joint Cooperation Agreement). The JCA allows Apple to request a carveout from the parties' agreement for any country where "Google's usage share compared with other general search engines only declines to [redacted]% or less for [redacted] consecutive years." UPX6026 at -555 (written 30(b)(6) response: "Google's understanding of 'usage share' as used in the JCA is that 'usage share' refers to measurements of general-purpose search engine usage in commercially available third-party reporting services, such as comScore."); Des. Tr. 55:10–56:7 (Apple-EC 30(b)(6) Dep.); JX0024 at -822.

vi. Google's Android RSAs Restrict Preinstallation Of Other General Search Engines, But Not Specialized Search Engines Or Social Networks

359. Google's Android RSAs restrict preinstallation of other GSEs but not products such as specialized search engines or social networks. Tr. 8688:25–8689:9 (Israel (Def. Expert)); Tr. 4621:13–25 (Whinston (Pls. Expert)); *e.g.*, JX0071 at -405 (§ 9.3(a)) (Samsung RSA (2020)) (exempting vertical search from contract provisions applying to alternative search services, unless the service is "incorporating a set of vertical searches"); UPX0322 at -879 (Google's proposal for Samsung allowing vertical providers like Expedia to serve results to certain Bixby queries).

360. For example, Google's exclusive agreement with Verizon between 2011 and 2014 provided that the "placement and General Web Search Access Point requirements only pertain to

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applications and services that provide 'General Web Search' services." JX0016 at -678 (limiting to GSEs the placement requirement that Google be set "as the default search provider for all General Web Search access points" on Verizon devices); Tr. 1035:14–1037:13 (Higgins (Verizon)) (discussing JX0016).

f) Other Industry Participants And Industry Analysts Recognize General Search Engines As Its Own Market

361. Other industry participants recognize general search services as a relevant product market. Tr. 4761:6–4762:17, 4614:9–4616:8, 5744:21–5745:20 (Whinston (Pls. Expert)).

i. Industry Analysts Recognize The General Search Services Market

362. Industry analysts calculate market shares for the general search services market. Tr. 199:12–22 (Google (Varian)) (ComScore sells market share data about search engines); Tr. 4619:21–4620:7 (Whinston (Pls. Expert)); Tr. 8684:7–8685:1 (Israel (Def. Expert)); UPX0336 at -474 (referring to ComScore's measure of Google's market share "compared to other general search engines only"). Industry participants rely on calculations of GSEs' market share, for example from StatCounter, ComScore, and others, and consider these reliable. Tr. 3832:6–25, 3834:2–18 (Lowcock (IPG)) (discussing UPX0450, an IPG client document providing a graph listing "search engine market share" in the U.S. among Google, Bing, Yahoo, DuckDuckGo, Ecosia, and Yandex).

ii. Other General Search Engines Recognize The General Search Services Market

363. Other (non-Google) GSEs recognize GSEs as providing a product and service distinct from specialized search engines. Des. Tr. 25:22–26:14 (Ramalingam (Yahoo) Dep.) (search engines focused on providing particular results were called "verticals" and they are separate and apart from general search).

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364. Further, other (non-Google) GSEs describe GSEs, not specialized search engines, as their closest competitors. Microsoft considers Google to be Bing's only competition. Tr. 3098:6–3099:3 (Tinter (Microsoft)) (when thinking about Bing's search competitors "it's one company, it's Google"); Tr. 6221:5–6223:2 (Barrett-Bowen (Microsoft)) (Bing does not view vertical partners as "competitors" even though they may have user overlap in some instances). DuckDuckGo's CEO similarly testified that its competitors include other GSEs, but not specialized search engines such as Amazon. Tr. 1942:11–1942:21 (Weinberg (DuckDuckGo)).

365. Other (non-Google) GSEs compare themselves to GSEs. For example, as testimony from Microsoft executives confirms, Bing compares itself with Google and other GSEs, including in side-by-side comparisons in various markets, among them the United States. Tr. 2718:19–2719:4 (Parakhin (Microsoft)); UPX0832 at -501 (comparing OneSearch's features to Google, Bing, and Yahoo Search); DX0524 at -762 (comparing Bing's search engineering team size against Google's); PSX01148 at -390 (the "Bing Challenge" is a side-by-side comparison done in the United States).

iii. Consumers Recognize General Search Engines As Comprising A Relevant Product Market

366. Based on usage, consumers recognize GSEs as a relevant product market. Tr. 4614:9–25 (Whinston (Pls. Expert)) (empirical evidence shows that 77% of first searches and sessions are on a GSE and therefore consumers are using it as a gateway to the entire internet).

iv. Other Market Participants Recognize The General Search Market

367. Google's partners recognize GSEs are distinct from specialized search engines. Tr. 1030:13–1032:2 (Higgins (Verizon)). Apple, for example, recognizes that specialized search engines that focus on a particular subject are not GSEs. Des. Tr. 59:25–60:19 (Apple-EC 30(b)(6) Dep.). Carriers compare the relative quality of GSEs and do not consider specialized

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search engines as substitutes for the default position on their devices. For example, when Verizon investigated its options for replacing Google on Verizon's devices, it evaluated Google's quality as compared with only Yahoo and Bing. UPX0622 at -064–65 (noting that "Bing does outperform Google" in certain areas). Carriers do not see the value in making specialized search engines the default search engine on devices because users prefer GSEs. Tr. 1032:3–24 (Higgins (Verizon)). And as an AT&T executive testified, AT&T viewed Bing as the only real alternative to Google. Des. Tr. 240:6–241:4 (Ezell (AT&T) Dep.).

368. Browser companies compare the relative quality of GSEs and do not consider specialized vertical search engines as a substitute. Des. Tr. 63:17–22 (Baker (Mozilla) Dep) (explaining Mozilla in 2014 compared the quality of Yahoo, Google, and Bing); Tr. 2167:21–2169:11 (Giannandrea (Apple)) (explaining the differences between GSEs (i.e., Bing, Yahoo, you.com, and DuckDuckGo) and specialized search engines (e.g., Facebook, Amazon, and TikTok); *id.* 2170:21–2171:13 (Safari's URL bar is intended to default to a GSE, and not a specialized search engine).

v. Specialized Search Engines Recognize They Participate In Markets Separate From General Search Engines

369. Specialized search engines identify other specialized search engines, not GSEs, as their competition. Tr. 5346:1–14 (Dijk (Booking.com)) (Google Search is not a competitor of Booking.com, but specialized verticals like Google Travel are); Des. Tr. 95:15–16, 95:18–96:3, 96:5–10, 96:12–25, 284:15–285:7 (Dacey (TripAdvisor) Dep.) (TripAdvisor competes with OTAs, hotels, and Google's travel product, not Google's general search).

2. General Search Services Require Unique Production Facilities

370. The uniqueness of a GSE stack supports a finding that general search services comprise a relevant product market; specifically the ability to provide responses based on

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independent or syndicated capabilities including crawling and indexing a large proportion of the web and retrieving information relevant to general queries from across the broader internet. *Supra* ¶¶ 65–72 (§ III.A.1).

3. A Monopolist Of General Search Services Would Be Able To Sustain Quality Significantly Below The Competitive Level

371. A GSE with a monopoly position in the general search services market would be able to sustain prices significantly above, or decrease quality significantly below, the competitive level. Tr. 4603:7–4616:25 (Whinston (Pls. Expert)).

a) Google's User Experiments Support The Finding Of General Search Services As A Relevant Product Market

372. Google has conducted quality degradation experiments, intentionally increasing latency, or otherwise decreasing quality for some users, to study their responses. UPX1082 at -294. These experiments show little user responsiveness to decreases in Google's quality, suggesting that potential search alternatives like specialized search engines or social networks are not a strong competitive constraint on Google. UPX1082 at -294; Tr. 4770:23–4772:24 (Whinston (Pls. Expert)) (when Google creates significant reductions in search engine quality, substitution to other alternatives is limited); *id.* 10469:17–10470:5. This low user responsiveness to decreases in quality indicates that a GSE monopolist could sustain quality significantly below the competitive level. UPX1082 at -294 (Google presentation summarizing quality degradation experiments showing that a reduction in 1 IS point of quality is expected to cause a [redacted] decline in search volume).

4. General Search Engines Have No Reasonably Interchangeable Alternatives

373. Firms such as Amazon, Facebook, Instagram, and TikTok are not reasonable substitutes for GSEs. Tr. 4618:4–4619:20, 6153:12–18 (Whinston (Pls. Expert)). Notably, such firms, including specifically Amazon, have endeavored to create offerings competitive with

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Google Search and have been unsuccessful. UPX0432 at -345 (Google competitive analysis stating "Amazon tried and failed to create a competitive search offering"); Des. Tr. 78:17–79:21 (van der Kooi (Microsoft)). Further, the growth of vertical search over the past decade has not dented Google Search's extraordinary revenues and profits. UPX7002.A at -774 (booked revenue for Google Search increased from $46 billion in 2014 to $146 billion in 2021).

a) Social Media Is Not A Reasonable Substitute For General Search

374. Social media is not a reasonable substitute for GSEs. UPX0346 at .001 (search users on YouTube differ from those on google.com because they are in a different mindset); Des. Tr. 218:19–219:2 (Baker (Mozilla) Dep.) (Firefox and its users would not consider Facebook a substitute for a GSE); Tr. 5241:12–5243:17 (Dijk (Booking.com)) (Facebook, Instagram, and TikTok are not GSEs); Tr. 4618:4–4619:20 (Whinston (Pls. Expert)).

375. Social media platforms do not provide information directly from the open web. Tr: 4618:12–4619:20 (Whinston (Pls. Expert)). Unlike GSEs, social media platforms search only their own content. Tr. 2168:5–2168:22 (Giannandrea (Apple)); Des. Tr. 78:9–79:21 (van der Kooi (Microsoft) Dep.) (describing sites such as Facebook as "catalog search," distinct from "generic internet search"); UPX0334 at -085 (chart by Dr. Varian in which Google and Microsoft, but not Facebook are identified as operating general purpose search engines). For example, "if you do a search on TikTok, what you get back is TikTok content." Tr. 7420:22–25 (Raghavan (Google)).

376. On social media platforms, users typically do not enter a query or receive a SERP; instead, users are presented with an information feed. UPX0033 at -120 (Facebook, Instagram, TikTok, and Twitter are "[l]ean-back, low intent content consumption feed platforms"); UPX2114 at -761 (in 2021, Facebook's Vice President of Ads Engineering wrote: "people don't come to core [Facebook] products with intent (unlike search), from the beginning, we knew we

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were about demand generation, not demand fulfillment"); UPX0445 at -507–08. As Dr. Israel conceded, TikTok does not provide a SERP, and therefore would not be a substitute for "any user that wants a SERP." Tr. 8675:20–8676:3 (Israel (Def. Expert)). Accordingly, social media platforms provide consumers with different and less reliable information than GSEs. Tr: 4618:12–4619:20 (Whinston (Pls. Expert)); *id.* 6153:12–18 (comparing DXD-15 at .006 to DXD-15 at .016 and describing differences between Google and Facebook results for the query "running shoes").

377. Search users do not substitute between Facebook and Google. This is because "[s]earch users are typically looking for something specific," while "social users are interested in what social communities or their peers are doing, saying, buying or debating." UPX0409 at -254. An internal Google study showed that users who increase their use of Facebook use Google more often, rather than less. UPX0902 at -020; Tr. 197:4–199:1 (Varian (Google)) (unaware of more recent studies on the impact of Facebook on Google Search than UPX0902); UPX0904 at -148–56 (Facebook usage positively correlated with Google searches).

b) Specialized Vertical Providers (e.g., Amazon, Yelp) Are Not Reasonable Substitutes For General Search Engines

378. Specialized Vertical Providers (SVPs) are also not reasonable substitutes for GSEs. Des. Tr. 141:11–17 (Miller (Google)). Where a GSE provides answers without any specific domain restriction, an SVP will either be focused on a particular domain, or on a particular aspect or vertical. Des. Tr. 27:25–28:1; 28:3–28:10 (Ramalingam (Yahoo) Dep.). The results returned to a query entered into an SVP would be different than those returned to the same query entered into a GSE. Des. Tr. 29:16–19, 29:21–30:3 (Ramalingam (Yahoo) Dep.). Google's internal documents recognize that the core competencies of SVPs differ from those of Google's GSE. UPX0329 at -378.004–378.005 (Dr. Varian's chart showing the capabilities

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across industries for Apple, Google, Amazon, Facebook, and Microsoft; Google and Microsoft are the only two companies identified as competing as "general purpose search engines," while Amazon, Apple, Google, and Microsoft are identified as competing in a separate "special purposes search engines" category); UPX0332 at -673. Also, there are many queries that an SVP simply cannot answer. Des. Tr. 276:25–278:7 (Dacey (TripAdvisor) Dep.) (TripAdvisor cannot answer various sets of queries (e.g., news, sports scores, stock prices, clothing, home repair, gas prices, historical info, movie reviews, health info); Tr. 8715:25–8716:11 (Israel (Def. Expert)) (discussing Yelp's provision of a null response to a query). In fact, specialized search engines can be complementary to Google's GSE. UPX0344 at -058 ("our [Google's] analysis indicates that [users active on Amazon and large online retailers' sites are] likely incremental to rather than cannibalizing their activity on G.com"); UPX0345 at -792 (stating Google "could not see any significant negative incremental impact from Amazon"); Tr. 8736:5–9 (Israel (Def. Expert)) (There are "elements of complementarity between" Amazon and Google.).

379. Unlike GSEs, many specialized search engines only permit searches in pre-defined ways. Tr. 6511:8–23 (Hurst (Expedia)) (Expedia Group "only works with structured queries," which include information like "where you're going, what dates you're going, and how many people are going."). On the other hand, Google "can respond to any query that you type into its text box" and is "returning results from anything it has scraped on the Internet." *Id.* 6511:8–23; Tr. 4616:9–25 (Whinston (Pls. Expert)) (searches on many specialized search engines "have to be done in predefined ways" while "[i]n a general search engine, you can put anything in").

380. Specialized search providers like Yelp, Expedia, or Kayak, search only "a very narrow set of content." Tr. 8096:23–8097:14 (Gomes (Google)) (Google and Bing serve broader

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information interests than Amazon, which services only product listings); Tr. 8266:19–8268:23 (Reid (Google)) (unlike GSEs, Expedia, Yelp, Amazon, and DoorDash are not aiming to answer all queries); Tr. 9144:4–12 (Holden (Google)) ("Metasearch engines are … another level of aggregation, you could say, in—where a consumer can go to look for travel specific information"); Tr. 2168:23–2169:11 (Giannandrea (Apple)); Des. Tr. 181:6–182:15 (Stein (IAC) Dep.) (Angi is focused on connecting consumers with service professionals).

381. Many specialized search engines, including Amazon, only search their own content and not the worldwide web. Tr. 2168:15–17, 2169:3–2169:8 (Giannandrea (Apple)); Des. Tr. 278:8–13 (Dacey (TripAdvisor) Dep.) (TripAdvisor does not crawl or index the web, and has no plans to); Des. Tr. 182:8–15 (Stein (IAC) Dep.) (Angi does not crawl or index the web, nor does it have any plans to do so). As one Microsoft executive testified, sites such as Amazon and YouTube provide "catalog search," distinct from "generic internet search." Des. Tr. 78:9–79:21 (van der Kooi (Microsoft) Dep.); Tr: 4616:9–25 (Whinston (Pls. Expert)) (many specialized search engines are "not sending you off to other sites, they don't have a broad index of the web").

382. Even in the shopping vertical, consumers often use Google and Amazon for different, complementary tasks. Tr. 7434:22–7435:14 (Raghavan (Google)) (there is a correlation between Google search usage and Amazon Prime membership because "Prime members who in any way intend to shop at Amazon might come to Google and do a lot of research before they do it"); Tr. 8097:23–8098:1 (Gomes (Google)) (users can search for a plumber on Google but not Amazon); PSX00267 at -258–59 (Google presentation titled "Google and Amazon in US Retail" showing Amazon Prime members are more likely to use Google, suggesting Google search is a complement to searches on Amazon).

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383. Most specialized search engines serve only commercial queries. Des. Tr. 39:15–41:19 (Google-EM 30(b)(6) Dep.) ("the results from Expedia would not be useful" for general-information queries); Des. Tr. 110:10–24 (Fox (Google) Dep.) (defining a commercial query as one where the user is likely "looking to conduct . . . a transaction for a product or service"); Tr. 8396:16–8398:17 (Israel (Def. Expert)). For Google, however, commercial queries make up only 20% of all queries. *Id.* 8725:15–8726:8; UPX0010 at -053 & n.6 (As of January 2020 "the vast majority of queries [–about 80%–] don't show any ads at all."); Tr. 5876:21–5877:11 (Whinston (Pls. Expert)).

384. Industry participants recognize that specialized search engines such as Amazon are not GSEs. Tr. 7426:15–20 (Raghavan (Google)) (Amazon is not a "general purpose search engine"); Tr. 183:16–18 (Varian (Google)) (Amazon does not provide a GSE); Des. Tr. 37:2–19 (Google-EM 30(b)(6) Dep.) (identifying only Google, Bing, DuckDuckGo, Ecosia, Baidu, and Qwant as the companies Google refers to as "search engines"); Tr. 5230:20–23 (Dijk (Booking.com) (Booking.com is not a GSE, but rather an e-commerce platform); *id.* 5241:12–5243:20 (stating he does not consider Facebook to be a GSE); Tr. 2167:5–2169:11 (Giannandrea (Apple)); UPX0911 at -875 (2019 email written by Joan Braddi (Google) stating that "Amazon is not considered a search site").

385. Google's analyses show that search users do not substitute between Google and shopping specialized search engines such as Amazon. One analysis, code-named Project Charlotte, found loyalty club membership (e.g. Amazon Prime) and other engagement with online retailers correlated with more, not fewer, queries on Google. Tr. 7430:2–7435:20 (Raghavan (Google)) ("Prime members who in any way intend to shop at Amazon might come to Google and do a lot of research before they do it. So we will see that correlation.") (discussing

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UPX0344 at -058–60); Des. Tr. 141:11–17 (Miller (Google) Dep.) (internal Google research shows "more active users on Amazon are also more active users on [Google] Search."). Project Charlotte followed an earlier 2018 analysis concluding that Google observed a $[redacted] per user uplift in search revenue among signed-in U.S. Android users who installed Amazon's app and were likely to be active on it during the following 28 days. UPX0335 at -687.

386. A second study found a positive correlation between Amazon app use and query volume, concluding Amazon app users were more likely to be regular and frequent Google users. Tr. 8733:1–8734:13 (Israel (Def. Expert) (discussing PSX00562 at -966). The study went on to conclude that a user's adoption of any of six major apps—Amazon, eBay, Walmart, Pinterest, Spotify, or Twitter—was correlated to increased revenue and queries on Google mobile, and no significant change on desktop behavior. *Id.* 8737:24–8738:19 (discussing PSX00562 at -976–77); Des. Tr. 146:7–147:23 (Miller (Google) Dep.) ("[P]eople who installed these apps saw increased usage on Google both for mobile queries and for shopping queries.") (discussing PSX00562 at -977).

387. Specialized search engines are among the top advertisers on Google, but Google Search does not advertise on specialized search engines. Tr. 193:6–18 (Varian (Google)); Des. Tr. 220:21–221:6 (Soo (OpenTable) Dep.) (OpenTable does search engine marketing on Google.); Tr. 4614:9–4615:16 (Whinston (Pls. Expert)) (Specialized search engines are the biggest advertisers on Google and Bing.); Tr. 8741:16–23 (Israel (Def. Expert)) (Amazon and Yelp clearly believe it is effective to advertise on Google.). Indeed, Amazon is the top advertiser on Google whereas Google Search does not advertise on Amazon. DX1121 (data file titled "RFP Request 42(b) – Top 250 Search Advertisers (2012–2021).xlsx") (Amazon was the top advertiser

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on Google in 2020 and 2021); Tr. 7441:1–7442:1 (Raghavan (Google)) (As one of the largest advertisers on Google, Amazon spends billions of dollars).

c) Apple's Suggestions Is Not A Reasonable Substitute For General Search Engines

388. Apple's Suggestions is not a substitute for a GSE. As an initial matter, like TikTok and other social media firms, Apple Suggestions do not produce a SERP. Tr. 2223:9–10 (Giannandrea (Apple))**.** In addition, Apple's Suggestions only appear on [redacted] of user queries. *Id.* 2250:8–2251:9.

389. Similarly, Apple's Spotlight is not a reasonable substitute for a GSE. Spotlight's primary focus is locating content on the user's device. Tr. 2204:23–2205:3 (Giannandrea (Apple)) (Spotlight focuses on finding content on the device first and then falling back to search); *id.* 2205:16–21 (because it does not search the web in the first instance, Spotlight is not a GSE).

d) Voice Assistants Including Apple's Siri Are Not A Reasonable Substitute For General Search Engines

390. Voice assistants, including Apple's Siri, are not a reasonable substitute for GSEs. As an initial matter, voice assistants such as Apple's Siri do not provide users with a SERP. Tr. 2237:22–23 (Giannandrea (Apple)). Further, and unlike GSEs, voice assistants primarily enable users to conduct tasks, such as sending messages. *Id.* 2236:23–2237:10 (Mostly, Siri plays music, sends texts, or turns on the living room lights.); Des. Tr. 292:23–293:11 (Connell (Microsoft) Dep.) (Siri and Cortana are used to "command the device."); UPX0320 at -621 (Google Assistant "helps you get things done."). Voice assistants, and Siri specifically, do not compete with GSEs today. DX0609 at -326 ("Siri doesn't compete directly against Google search. It competes against Alexa and Google Assistant. The query mix is very different."); Tr. 2236:13–15 (Giannandrea (Apple)) (Siri is Apple's voice assistant.)*; id.* 2237:20–21 (Siri is

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not a GSE.); Des. Tr. 155:9–156:4, 280:20–281:13 (Ezell (AT&T) Dep.) (Google's contracts allow Samsung's voice assistant—Bixby—to be preloaded on devices as long as it uses Google's GSE by default.).

e) Generative AI Systems Are Not A Reasonable Substitute For General Search Engines

391. Generative AI systems, like ChatGPT, are not a reasonable substitute for GSEs. These systems can be used to summarize results into a single answer, but they are not good at identifying which results need to be summarized. Tr. 3696:15–3697:21 (Ramaswamy (Neeva)) ("AI [lets] you do . . . things like summarization, presenting a single answer in ways that, honestly, search engines of old could not do. But the middle problem of figuring out what are the most relevant pages for a given query in a given context still benefits enormously from query click information. And it's absolutely not the case that AI models eliminate that need or supplant that need.").

392. Google and Bing's Generative AI tools, like Bard and Bing Chat, still rely on traditional search systems to provide answers to user's questions and queries; thus, they do not replace traditional search. Tr. 2670:19–2671:9 (Parakhin (Microsoft)) ("The large language model [in Bing Chat] is used for reasoning and for providing the answer, but the base information is coming from search."); *id.* 2670:10–18 (Bing Chat marries the functionality of ChatGPT and Bing); Tr. 8331:18–24 (Reid (Google)) (Google relies on the search index to verify or confirm Search Generative Experience (AI) responses against the results that it gets from Google search.); Tr. 3529:25–3530:10 (Nadella (Microsoft)) (Bing Chat "absolutely" still relies upon traditional search.).

393. Generative AI is a nascent technology. Tr. 8219:6–24, 8276:10–24 (Reid (Google)); Tr. 7531:15–7532:8 (Raghavan (Google)) ("And I view this as a journey, not as

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something that happened overnight. . . . And that's a journey that we're still early on."); Tr. 8333:16–8334:4 (Reid (Google)) (Google's "[Search Generative Experience] is very much in early stage."); *id.* 8270:23–25, 8283:14–20 (agreeing that Google's chatbot, Bard, is "experimental"); UPX2065 at -424 (Blog post by Google's CEO Mr. Pichai: Bard is "experimental."). It is unlikely that Generative AI tools will displace the need for traditional search. Tr. 7528:25–7530:8 (Raghavan (Google)) (does not believe that in 10 years people will be doing everything through chatbots and large language models); *id.* 7530:25–7531:8 (AI through chatbots and large language models have not created a whole new world and caused the old world to go away.) (discussing UPX2040 at -299).

394. There are several drawbacks to using Generative AI-based tools instead of traditional search. *First*, because of the time and expense of training Generative AI systems, those systems lack the ability to provide fresh information. Tr. 8279:19–21 (Reid (Google)) (agreeing that chatbots "are not trained super frequently"); *id.* 8281:13–16 (agreeing that people in the chatbot industry criticize chatbots "as having the ability to be stale because it takes such a long time and is so expensive to train them"). As Dr. Israel conceded, the information available on ChatGPT is approximately a year old, in contrast to the information available on Google, which is current. Tr. 8706:14–8707:1 (Israel (Def. Expert)). *Second*, Generative AI systems often produce inaccurate information. Tr. 8219:6–24 (Reid (Google)) ("[Google's chatbot] does have some challenges. It's not always accurate because it is fundamentally predicting what it should say. And it has some error problem[s], and so we have to be thoughtful about how we roll it out."); *id.* 8285:9–12 (agreeing that "[Large Language Model] experiences, Bard included, can hallucinate and present inaccurate information as factual"). Thus, Bard carries a disclaimer that says "Bard may display inaccurate or offensive information." *Id.* 8283:21–25; UPX2067 at -445–

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46 (listing "[k]nown limitations" of chatbots, including "misrepresent[ing] facts," "inaccurately identify[ing] insights" and "[b]ias"). *Third*, Generative AI systems, in contrast to GSEs, respond to user queries slowly. Tr. 8334:5–8 (Reid (Google)) (recognizing that "[s]peed is a limitation" of chatbots).

395. Users have not replaced their use of traditional search with chatbot-based search tools, like Google's Bard or Microsoft's Bing Chat. Tr. 8326:18–24 (Reid (Google)) (Google's chatbot receives only a "small portion" of Google's total daily users, at around 8 to 10 million.)

5. The United States Is The Relevant Geographic Market For General Search Services

396. The United States is the relevant geographic market for GSEs. Tr. 4654:3–21 (Whinston (Pls. Expert)). Google recognizes that the United States is a relevant geographic product market for the provision of general search services. Des. Tr. 21:25–23:11 (Google-NF 30(b)(6) Dep.) (describing instances where Google would measure country-specific general search market share). The product provided to the consumer—the SERP—differs materially as between the United States and countries abroad. For example, search results provided outside of the United States are often in languages other than English. *Id*. 21:25–23:11 (describing the importance of adapting to the Russian language to develop a good product in Russia). Consumer intent when entering a specific search query often differs abroad, and the SERP returned to a consumer in London, England, may include different content than the SERP provided to a customer in the United States. Tr. 7360:25–7362:2 (Raghavan (Google)) (a user in London entering the query "mousetrap" may be "looking for theater tickets to a long-running play in London called 'Mousetrap').

397. Internal documents at both Google and Bing, including the contracts at issue, recognize that the United States is a relevant geographic market for general search services. For

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example, the 2014 JCA between Google and Apple contemplated calculating GSE usage shares by country, and [redacted]. JX0024 at -822 (§ 1) (Apple JCA (2014)); JX0097 at –357 (§ 1) (Apple ISA (2021 amend.)). Microsoft documents also make assumptions and calculate shares specifically in the United States. UPX0115 at -142 (Microsoft assumptions based on market shares calculated in the U.S. general search services market).

B. Search Ads In The United States Compose A Relevant Market

398. As Dr. Varian recognized, Search Ads in the United States compose a relevant market. UPX0452 at -001 ("[T]here is a market for search advertising of course."); Tr. 419:9–421:19 (Varian (Google)) (discussing UPX0452); Tr. 4600:2–14 (referring to UPXD102 at 3) (Whinston (Pls. Expert)). Search Ads compose a distinct advertising channel. Tr. 5376:22–5377:10 (Jerath (Pls. Expert)) ("[S]earch ads more broadly are a distinct product category of advertising.").

1. The Characteristics And Uses Of Search Ads Support Finding A Search Ads Market

a) Search Ads Target A Consumer's Real-Time, Self-Expressed Declaration Of Intent

399. Search Ads are the only ad channel displayed on a SERP in response to a user query. Tr. 1347:8–10 (Dischler (Google)) (Google does not show display ads in response to a query); Tr. 8829:2–6 (Israel (Def. Expert)) (Ads shown in response to search queries are Search Ads, and display ads are not done that way.). As a result, Search Ads are uniquely able to respond to a consumer's real-time, self-expressed declaration of intent, whereas other ad channels are not. *Compare supra* ¶¶ 120–127 (§ III.C.2.c) *with supra* ¶¶ 128–137 (§ III.C.2.d).

400. Search Ads' ability to target consumers' real-time intent is a significant difference between Search Ads and other types of ads. As Adam Juda, Google's VP of Ads, explained in an

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internal Google email, "SearchAds are fundamentally different than DisplayAds because they are targeted to the user's query (and thus are relevant to the users' task in a different way than an awareness–generating ad)." UPX0459 at -871; UPX0416 at -117 (Dr. Juda writes that Google Display Network is "nowhere close to Search-like from my perspective (very different CPCs, CVRs [conversion rates], CTRs [click-through rates], user intent, etc.)."); UPX0272 at -699 (Microsoft "Privacy and Search Advertising" memo stating, "Search advertising is different from Display advertising in many respects," including that Search Ads are "intent-driven" and "relevance-driven"); UPX0439 at -112 ("PLAs shown on shopping queries match the user intent . . . whereas display ads are often unrelated to the user intent."); UPX0413 at -734 (Dr. Varian explains, "[Q]uery terms are a far stronger signal of user intent than past behavior," which is used to target display ads.); UPX0428 at -863.010–11 ("A signal of intent is the most valuable thing you could have, more valuable than what the user likes or where the user is located"; other ads "don't really have a signal of 'intent' like Search ads do.").

401. Google advises advertisers to choose Search Ads for "[h]ighly specific targeting," in contrast to display ads, which "let you reach a relevant audience . . . as they browse millions of websites, apps, and Google-owned properties . . . ." UPX8088 at -393 (directing advertisers to choose Search Ads for "[h]ighly specific targeting," versus display ads for "[a]wareness and consideration"); Tr. 4644:15–4645:3 (Whinston (Pls. Expert)) (discussing UPX8088 at -393, excerpted in UPXD102 at 31); Tr. 6587:18–6589:2 (Vallez (Skai)) ("pull ads" (e.g., Search Ads) are served when a consumer is actively searching for information and "push ads" (e.g., video, display, and social media ads) are a "lean-back" passive experience where users are served ads that may or may not be relevant).

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402. Google's own guidance to advertisers further emphasizes as a "key take-away[]" that display ads are unable to target consumers and serve relevant ads the way Search Ads can, explaining:

> While Search ads show up to potential customers the moment that they start looking on Google for what you offer, Display ads show up while people are visiting sites across the Google Display Network. When running Display ads, you might not reach those who are actively searching for what you offer. That said, you're still introducing your business to a specific target audience who is likely to be interested in your products or services. This may help you to reach a larger or completely new audience than simply through search.

UPX8056 at .002 (Google Ads page); Des. Tr. 112:4–22 (Jain (Google) Dep.) ("If you're reading the New York Times online and there's ads there, those are display ads, because you didn't search for anything. You're just browsing for content. Most of the ads on Facebook are display ads if you didn't search for anything."); UPX8089 at -398 (Google Ads Help, "While the Search Network can reach people while they search for specific goods or services, the Display Network can help you capture someone's attention earlier in the buying cycle. You can put your ads in front of people *before* they start searching for what you offer . . . .").

403. Because Search Ads can target user intent more specifically via queries, Search Ads do not need to rely on broader techniques, such as audience targeting, upon which display ads and traditional advertising predominately rely. Tr. 1174:15–1176:1 (Dischler (Google)) (because they are served in response to a query, Search Ads are a more focused advertising format than formats such as television that are aimed at large, diffuse audiences); Tr. 8829:13–25 (Israel (Def. Expert)) (display ads target based on page and person, Search Ads target based on query); Des. Tr. 55:18–56:7 (Miller (Google) Dep.) (primary targeting for Search Ads is intent of the users and audience signals are secondary); Des. Tr. 111:21–112:22 (Jain (Google) Dep.) ("[F]or Search, as someone types in a query, we have the bulk of the signal from that. . . . [T]he notion of audience targeting is predominantly applied to display ads, not Search ads.");

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UPX0022 at -908 ("Personalized data is not very helpful for search advertising since the query is such a strong signal."); Des. Tr. 175:20–23, 175:25–176:5 (Daniels (Thumbtack) Dep.) (main difference between Text Ads and television ads is specificity by which one can target customers, given the latter is "broader based and less targeted").

404. For example, for non-search channels, Kohl's targets "audiences" with "attributes that [they] will assign to really define that target audience"; Kohl's does not engage in similar audience targeting for Search Ads other than changing its bid strategies for existing customers. Des. Tr. 30:15–31:12 (Raymond (Kohl's) Dep.).

405. Search Ads' ability to target consumer's real-time declared intent remains significant when compared to intent signals that can be derived from social media sites like Facebook, where users may express general interest in a subject, such as by interacting with different groups. For example, an Expedia executive noted that "even the theory behind [Search Ads and social ads] is pretty different," explaining:

> [I]t's really based on intent and where someone is in a purchase decision. . . . [W]e would rarely know in a social channel if someone is trying to book travel right now. We would know they have an affinity for it. Maybe they're interacting with different groups or different ads. But we wouldn't be as likely to know I'm trying to go to Miami October 20th through 22nd, which is kind of the most information you would know in Google and a pretty frequent use case in Google.

Tr. 6512:23–6513:24 (Hurst (Expedia)); Des. Tr. 56:11–57:14, 287:7–289:2 (Utter (Microsoft) Dep.) ("In a search engine, you are describing your intent with a very firm signal, a query. On Facebook as a social platform . . . [t]he intent in what a consumer is trying to do is actually very different."); Des. Tr. 174:24–175:3, 175:6–19 (Daniels (Thumbtack) Dep.) (The "main difference" between Text Ads and Facebook ads is that the former let one "target . . . search queries" while the latter do not "have the ability to target based on specific text search queries" and use "mostly demographic-based targeting.").

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406. Google itself recognizes a significant difference in targetability between Search Ads and social ads on Facebook. Tr. 1484:19–1485:13 (Dischler (Google)) (a significant difference between Facebook's ads and Google's Search Ads is that Search Ads are shown in response to a user's query, but Facebook ads are not); UPX0418 at .001 ("Google knows identity AND intent. Facebook doesn't know what users want"); Des. Tr. 112:9–17 (Miller (Google) Dep.) (explaining UPX0418 at .001: "[T]his whole document was trying to give sales teams collateral and talking points to advertisers about why they should spend with Google over Facebook. This is referring to that many users come to Google and tell us what they're looking for through the search query, and that is a very powerful signal."); Des. Tr. 112:23–114:3, 115:15–116:1 (Jain (Google) Dep.) (presence of a query distinguishes Search Ads from ads on Facebook).

b) Search Ads Are More Suited And Effective At Harvesting Demand Than Are Other Ads

407. Search Ads are more suited and effective at achieving goals related to harvesting demand, whereas other types of ads are more suited and effective at achieving goals related to generating demand. Tr. 3819:10–17 (Lowcock (IPG)). *Compare supra* ¶¶ 120–127 (§ III.C.2.c) *with supra* ¶¶ 128–137 (§ III.C.2.d).

408. Google itself recognizes this as a key distinction. For example, Google acknowledges that "[o]ne way to think about the difference between search and display/brand advertising is to say that 'search ads help satisfy demand while brand advertising helps to create demand.'" UPX0411 at -638; UPX0433 at -826 ("Search 'answers demand' whereas Display 'creates demand.'").

409. Indeed, Search Ads perform a different function than other ad types and are more effective at harvesting demand. For example, when The Home Depot conducted separate "go

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dark" incrementality tests to measure the impacts of turning off Search Ads and display ads, the results showed that turning off Search Ads resulted in a meaningful drop in revenue, with a greater impact on sales compared to when display ads were turned off. Tr. 5146:12–5148:3, 5148:17–5149:3, 5170:7–17 (Booth (The Home Depot)) (explaining tests and discussing PSX00676 at -240); PSX00676 at -240 ("THD topline revenue dropped [redacted]% when we turned off paid search [(PLAs & Text Ads).] For every $1 invested into paid search, THD gains an incremental $[redacted].").

410. As another example, Arjan Dijk, Senior Vice President and Chief Marketing Officer of Booking.com, noted that although consumers do click on Facebook ads and make purchases on Booking.com, such conversions are "very minimal" relative to the performance of Search Ads. Tr. 5242:10–13 (Dijk (Booking.com)).

411. Similarly, Ms. Lim explained that Search Ads are not fungible with display ads because Search Ads "exist for a different reason" and have a "singular objective" of driving acquisitions. Tr. 4858:4–16 (Lim (JPMorgan)) ("[P]aid search is an acquisition driver. . . . Whereas, a digital ad may be trying to drive awareness or, you know, increase demand for something . . . . So various different objectives happening in the digital space, singular objective in paid search."); Tr. 5170:18–5171:8 (Booth (The Home Depot)) (he would not consider stopping spend on Search Ads and putting that money to display or social ads).

412. By contrast, display ads are focused more on generating demand as compared to Search Ads. Tr. 3819:10–17 (Lowcock (IPG)) ("Display advertising is primarily intended to drive or create demand" and "[s]earch advertising is there to capture intent after you have driven awareness."); Tr. 4003:18–21, 4004:1–4005:1 (Juda (Google)) (relative to a Search Ad, a display ad is more likely intended to drive awareness); Tr. 4841:2–12 (Lim (JPMorgan)) ("[P]aid social,

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that's—those are channels that we use to do a variety of different things, mainly awareness . . . . [I]t has a distinctly different role at our firm than paid search."); Tr. 5241:17–5243:17, 5279:21–5280:9 (Dijk (Booking.com)) (Booking.com advertises on Facebook, Instagram, and TikTok to drive awareness and consideration).

c) Search Ads Are Distinct From Retargeted Display Ads

413. Search Ads are distinct from retargeted (sometimes referred to as remarketing) display ads. Tr. 455:15–456:17 (Varian (Google)); Tr. 5220:9–13 (Booth (The Home Depot)) (retargeting ads cannot replace Search Ads); UPX0414 at -697 ("With remarketing, . . . [t]he user is worth more than a random display ad clicker, but less than someone who just searched.").

414. Search Ads and retargeted display ads differ along four primary characteristics. Tr. 5445:12–5448:9 (Jerath (Pls. Expert)) (discussing UPXD103 at 20 and giving examples demonstrating how the differences between the two ad channels can play out).

415. *(1) What type of intent the targeting is based on*. With Search Ads, targeting is based on real-time declared intent, whereas with retargeted display ads, targeting is based on inferred intent from signals, which can become stale. Tr. 5445:12–5448:9 (Jerath (Pls. Expert)); UPX0026 at -764–65 ("Most of the value of retargeted ads occurs in first hour or so after the user visits the advertiser's web page."); Tr. 456:18–457:17 (Varian (Google)) (acknowledging authorship of UPX0026 and adopting this observation as true); *id.* 456:6–17 (the value of retargeting fades over time); UPX9001.A at 9:3–7, 6:24–7:5 (transcript of 2020 video of Dr. Varian discussing Search Ads: "[R]ecency is everything. . . . [R]eminder ads are a form of intent. [But] [i]t's not as strong as the intent when you are searching something . . . ."); Tr. 5220:9–5221:1 (Booth (The Home Depot)) (Retargeting ads can be shown even if the person has already purchased the product.); Tr. 5449:2–17 (Jerath (Pls. Expert)) (discussing UPXD103 at 21).

[redacted]

416. *(2) Whom the ad is able to target.* Search Ads can target anybody who types a relevant query, whereas retargeted display ads can only be shown to people who have already visited the advertiser's website. Tr. 5445:12–5448:9 (Jerath (Pls. Expert)); Tr. 455:25–456:5 (Varian (Google)).

417. *(3) What the content of the ad reflects.* Search Ads typically reflect what the consumer is actually searching for, whereas retargeted display ads often show different products than what the consumer was initially interested in. Tr. 5445:12–5448:9 (Jerath (Pls. Expert)).

418. *(4) What the impact is of ongoing changes in consumer tracking.* Search Ads are uniquely unaffected by changes in consumer tracking because the consumer is declaring her interest at the moment of the query, whereas retargeted display ads are expected to become substantially less effective due to impediments to tracking consumers after they have left the advertiser's website. Tr. 5445:12–5448:9, 5654:5–5655:25 (Jerath (Pls. Expert)) (cookie deprecation has "very little" impact on search ads especially in contrast with other kinds of advertising).

d) Google Does Not Sell Search Ads Through The Same Auction Process As Other Ads

419. Display ads do not participate in an auction with either Text Ads or shopping ads. Tr. 4006:23–25 (Juda (Google)).

420. Google's ad auctions for its Google Display Network and video advertisements in video campaigns are modified first price auctions, as opposed to second price auctions. UPX6032 at -655–56 (Google admission (Resp. 14) that video and display auctions "involve a pricing mechanism where the price the advertiser pays is determined in part by the highest bid"); -656 Response No. 15 (admitting Text Ads auction is "a type of generalized second price auction in which the price an advertiser pays is determined in part by the auction runner up").

[redacted]

e) Because Search Ads Are Targeted Using The Query, They Are Unaffected By Privacy Initiatives And Limitations On Cookie Tracking

421. Display ads, including social ads, and other non-Search Ads target users using "cookies" and audience profiling. Tr. 5445:24–5447:13 (Jerath (Pls. Expert)) (discussing UPXD103 at 20); UPX0413 at -735 (cookies are "used extensively for targeting display ads").

422. Because they are targeted using cookies and audience profiling, display ads and other non-Search Ads are affected by privacy initiatives aimed at restricting these tools. Tr. 5445:24–5447:13, 5448:10–5449:1 (Jerath (Pls. Expert)); UPX8048 at .002. For example, Apple's recent privacy initiatives have impacted Facebook's ability to sell retargeted ads. Tr. 8835:3–8836:8 (Israel (Def. Expert)) (Meta/Facebook was affected by Apple's and other privacy initiatives); Des. Tr. 164:13–165:6, 172:15–24 (Levy (Meta) Dep.) (As a result of Apple's privacy initiatives, Meta's "ability to help advertisers target their ads has been impacted negatively" and Apple's iOS 14 privacy changes have made "it much harder or potentially not even possible" for Meta to effectively retarget ads.); UPX0923 at -696 (Facebook executive emailing Meta CEO, COO, and others, in 2019, projecting that Apple's privacy initiatives would have "seismic ramifications to our ads business . . . [redacted]% of revenue potentially at risk . . . [t]argeting crippled, retargeting impossible . . ."); UPX2117 at -035 (CFO in Meta Platforms, Inc.'s Fourth Quarter 2021 Results Conference Call, on Feb. 2, 2022, characterizing "impact of iOS [privacy initiatives] overall as a headwind on [Meta's] business in 2022 is on the order of 10 billion"); UPX1018 at -726 (Meta board of directors meeting document predicting "regulatory and technology changes will cause an approximate [redacted]% revenue change to our 2023 long range plan").

[redacted]

423. Indeed, Apple's privacy initiative dramatically decreased advertisers' ability to retarget display ads on Facebook and elsewhere. Des. Tr. 123:22–125:16 (Raymond (Kohl's) Dep.).

424. However, and as conceded by Dr. Israel, because Search Ads rely primarily on a query, they are uniquely unaffected by these initiatives. Tr. 8831:10–8832:8 (Israel (Def. Expert)); Tr. 5445:24–5447:13, 5654:5–5655:25 (Jerath (Pls. Expert)) ("History leads to the signal. The signal is used in display advertising to infer your interest and so forth. And search advertising, what am I interested in? I just tell the search engine using my query. So, the relative value of any historical data is much less in search, and it is much more in display."); Des. Tr. 167:9–11, 167:12–21 (Levy (Meta) Dep.) ("the impact on Meta, at least proportional to our business or proportionally, it would be larger for us than it would for Google" excluding YouTube).

425. Apple's privacy initiatives have also limited the ability of Meta and others to identify which users viewing display and social ads later converted. Des. Tr. 177:23–178:4 (Levy (Facebook) Dep.). However, because sellers of Search Ads can track clicks on their ads, advertisers are still able to tell if a user, coming to their site via a click on a Search Ad, converted. UPX8047 at .001–02.

f) Google Developed A Non-Search Offering Because Of The Different Uses Of Social And Search Ads

426. Google's Demand Gen product, formerly known as Discovery Ads and introduced in 2019, includes visually rich ads displayed on Google's feed surfaces (YouTube, Gmail, the Discover feed, and the Google app), sold as a bundle, and not served in response to a query. Tr. 7538:17–22 (Raghavan (Google)); Tr. 1196:15–24 (Dischler (Google). Google launched Demand Gen/Discovery ads "because [Google] found advertisers were asking [it] why

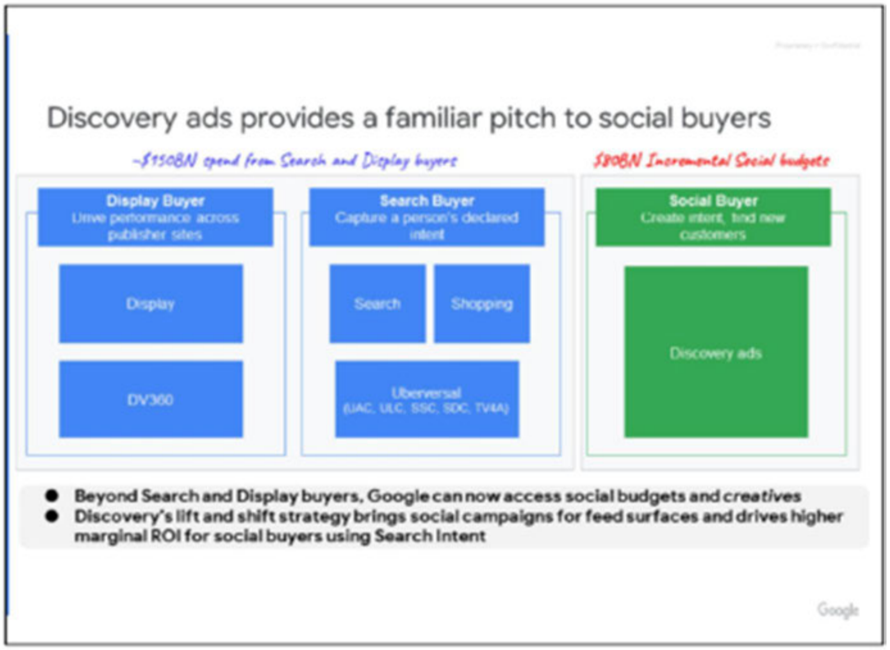
[redacted]

they couldn't get the types of social ads they could get from Facebook and Instagram from Google." Tr. 7539:6–10 (Raghavan (Google)); *id.* 7349:21–22 (similar for TikTok); Tr. 1197:3–5 (Dischler (Google)); Tr. 4646:9–4647:7 (Whinston (Pls. Expert)). Google recognized that it had "no *direct* competitor to Facebook's ad offering," and others' social ads, and desired to build a new product to capture incremental advertiser spend. UPX0029 at -541 ("This new offering will enable us to capture dollars that are currently flowing exclusively to Facebook.")

427. Discovery/Demand Gen campaigns "are aimed at the latent intent that Facebook, Instagram, TikTok, and others are capturing," and are targeted using recent search and browsing behavior instead of keywords. Tr. 7543:25–7544:3, 7544:6–20 (Raghavan (Google)). In developing the Discovery product, Google recognized the distinguishing factor between its search products and social offerings is that search captures a user's declared intent through the query, therefore capturing demand, while social offerings create demand for new products. UPX0458 at -701 (Google is good at "driving conversions by following user intent expressed as queries on Search/Shopping properties," but advertisers also "need solutions that create intent in order to acquire new customers."). Google thus crafted Discovery Ads to provide a "familiar pitch" to social buyers, which Google distiguished from search buyers based explicitly on differing types of intent:

[redacted]

Figure 3: Comparing Buyers of Display, Search & Discovery Ads



UPX0033 at -145; Tr. 7541:8–7543:15 (Raghavan (Google)).

428. Google marketed and continues to market Demand Gen/Discovery Ads to social buyers. Midway through trial, Google made a post to X (formerly Twitter) asking "Are your social ads falling short of expectation? It's time to demand more from social advertising!" and promoting Demand Gen. UPX2041 at -303; Tr. 7540:16–7541:2, 7541:8–7543:15 (Raghavan (Google)) (with discovery ads, Google focused on creating ads that offered parity with Facebook ads); UPX0033 at -117 ("Discovery ads launched, allowing advertisers to extend the reach of their social ads to 2.9B+ Google Users . . . Discovery Ads pitch is crisp and simple . . . Simply reuse your social assets and campaigns to drive performance"); UPX0409 at -252 (internal Google training stating Discovery Campaigns will "enable us to capture dollars that are currently flowing exclusively to Facebook/Instagram as well as provide incremental reach to existing performance campaigns").

[redacted]

429. Demand Gen/Discovery Ad campaigns did not result in a shift of spend away from search, but instead created incremental revenue for Google. Tr. 7541:8–7543:15 (Raghavan (Google)) (Google Discovery ads do not cannibalize Search Ad revenues); UPX0033 at -146 (Google's discovery ads do not cannibalize other Google digital ads.).

2. Industry Recognition

a) Google Considers Search Ads To Be Distinct And Complementary Products To Other Digital Ads

430. Google views Search Ads as distinct from and complementary to other types of advertising. Tr. 5449:18–5450:17 (Jerath (Pls. Expert)) (discussing UPXD103 at 22). For example, Dr. Varian testified that he considers Facebook ads (i.e., displays ads) to be distinct from Search Ads. Tr. 458:4–5 (Varian (Google)). Dr. Varian also acknowledged forwarding an article to colleagues and calling out the article's conclusion that display ad impressions increased searches by 30 to 45 percent. *Id*. 462:7–15 (discussing UPX1085 at -616); UPX1085 at -616 (email with subject "spillover from display to search ads").

431. Google separates Search Ads from display ads in its internal financial documents. UPX0476 at -664.

432. Google has conducted internal studies concluding that Search Advertisers adopting display products "does not lead to cannibalized Search spend. In fact, we see a small but statistically significant increase in Search spend post Display adoption." UPX1118 at -191.

433. Google further views consumer experiences on Facebook as "fundamentally better suited for demand gen[eration]" and views Facebook itself as "lean[ing] into its reputation for driving demand to differentiate from Google Search." UPX0458 at -704; UPX0030 at -752 ("Overall, compare FB to display, not search due to different expectations for the role it plays – top of funnel, image ads, more prospecting, awareness. Intent isn't there.").

[redacted]

b) Advertisers And Other Industry Participants Consider Search Ads To Be Distinct And Complementary Products

434. Advertisers and other industry participants view Search Ads as distinct from and complementary to other types of advertising.

435. Advertisers view Search Ads as an "always on" or "mandatory" ad channel, in contrast to other ad channels. For example, Ms. Lim described "paid search" as "an always-on channel . . . like an evergreen media channel," running "[e]very day of every week of every month year-round." Tr. 4841:13–4842:3, 4849:4–25, 4858:18–4859:9 (Lim (JPMorgan)) (further confirming, in response to a question from the Court, that "it's common that financial institutions use paid search to drive acquisition year-round"). Other ad channels, however, "operate on a campaign timetable . . . [and have] a beginning, a middle, and an end." Tr. 4841:13–4842:3, 4842:15–4843:2 (Lim (JPMorgan)); DX0412 at 665 (Kohl's advertising "flighting approach" showing constant Search spend during ad campaign but significant variation among video, social, and display). Similarly, Mr. Lowcock described Search Ads as "mandatory" for any advertising campaign because Search Ads capture user intent and search behavior can be driven by other ad channels. Tr. 3819:10–17, 3824:20–3825:3, 3826:11–18, 3980:3–3981:6 (Lowcock (IPG)); Tr. 5449:18–5450:17 (Jerath (Pls. Expert)) (discussing UPXD103 at 24).

436. Also, advertisers do not view other forms of advertising as substitutes for Search Ads. For example, an Expedia executive explained that there "isn't a great substitute for the volume of high-intent customers you can find on Google" paid search. Tr. 6506:18–6507:11, 6515:21–6516:1 (Hurst (Expedia)). Mr. Dijk also noted that Booking.com purchases Search Ads to reach high-intent customers and cannot reach them effectively through other ad channels. Tr. 5236:18–5237:23, 5237:9–12 (Dijk (Booking.com)). Mr. Lowcock also does not consider

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Search Ads and display ads to be "substitutable." Tr. 3824:20–3825:3, 3980:3–3981:6, 3937:25–3838:2 (Lowcock (IPG)).

437. Industry participants recognize other ad channels as complementary to Search Ads. Des. Tr. 78:18–79:9, 80:4–12 (Levy (Meta) Dep) (Search Ads and social ads complement each other); Des. Tr. 25:10–26:9 (van der Kooi (Microsoft) Dep) (Snapchat, Pinterest, and TikTok "were not taking share from Microsoft Advertising" because "search is sort of unique in its characteristics on how it performs for advertisers and what it is used for."); UPX1014 at -067 (Kenshoo presentation to Facebook stating, "The digital marketing portfolio has many unique channels and formats . . . . [S]earch and social stick out as being the most complementary in a cross-channel relationship."); *id.* at -079 (Search Ads and social ads are "fundamentally different"); UPX0920 at -206 (Skechers employee noting "social is a lean back experience and does drive a lot of sessions to the funnel in general and helps with our paid search effort."); PSX00970 at -726 (ad agency presentation, noting that TikTok brand awareness campaign improved Search Ads cost per action (CPA), i.e., conversion, by driving consumers to search for the client, where their demand was then captured by Search Ads)).

438. Advertisers typically have separate marketing teams or groups that focus on Search Ads compared to other ad channels. Tr. 4837:1–10, 4838:4–13, 4839:9–4841:1, 4843:10–16 (Lim (JPMorgan)) (JPMorgan has three departments within its paid media practice: search (covering paid search and SEO); paid social; and programmatic (banner ads).); Tr. 5112:25–5113:1, 5113:12–21, 5117:20–5118:21, 5124:2–8 (Booth (The Home Depot)) (The Home Depot has separate teams for paid search, for "digital media" (covering paid social and display), and for traditional advertising (e.g., television and print)); Tr. 6590:23–6591:1 (Vallez (Skai)) (advertisers use different teams to support the different ad channels); Tr. 3805:20–24 (Lowcock

[redacted]

(IPG)) (IPG has an agency that specializes in Search Ads); Des. Tr. 186:9–187:9, 190:2–13 (James (Amazon) Dep.) (identifying different individuals responsible for paid search, display, and video); PSX00970 at -668 (listing ad agency's team to support the client with separate staff for "Paid Search" and "Paid Social").

439. Similarly, advertisers typically have separate budgets for Search Ads and other ad channels. Tr. 4856:16–4858:16 (Lim (JPMorgan)) ("Paid search budgets are for paid search only. . . . [I]t is not transferable between a programmatic buy across webpages and paid search. They are distinct and different and separate."); Tr. 5142:14–5143:4 (Booth (The Home Depot)) ("[O]ur Google and Bing investments are pretty much interchangeable but distinct and separate from social or display."); Des. Tr. 289:3–290:13 (Utter (Microsoft) Dep.) (advertisers typically have separate budgets for different ad channels, such as for search and for display, with "a lack of . . . fluidity or fungibility, kind of, across those types of accounts"); Des. Tr. 49:19–50:3 (Alberts (Dentsu) Dep.) (paid search budgets are separate from budgets for other advertising channels); Des. Tr. 28:24–30:11 (van der Kooi (Microsoft) Dep.) (Because advertisers have dedicated search budgets, advertising on platforms like Snapchat, Pinterest, and TikTok does not come at the expense of Search Ads).

3. Uniqueness Of Production Facilities

440. For Search Ads that appear on GSEs, the uniqueness of production facilities present in the general search services market apply in the Search Ads market. *Supra* ¶ 370. For Search Ads that appear on specialized search engines, production facilities require the capability either (1) to crawl the webpages of a given Internet domain or set of domains to search for answers to a narrow range of queries or (2) to license such web-crawl results. *Infra* ¶¶ 531–540 (§ V.A.2.a), 557–558 (§ V.A.3). Google and Bing run separate auctions for Search Ads versus other types of ads. Tr. 4018:21–4019:20 (Juda (Google)).

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441. Providing Search Ads requires the infrastructure and capabilities to (1) match Search Ads to consumers' real-time queries, (2) pull those ads into the relevant auction, (3) determine which ads in the auction will be shown, (4) determine where on the SERP the shown ads will be positioned, and (5) calculate the price for each ad shown, should it be clicked on. Tr. 5458:23–5459:6, 5462:11–5463:8 (Jerath (Pls. Expert)).

442. Advertisers buying Search Ads expect to manage, measure, and optimize their ad campaigns. Tr. 5458:23–5459:6, 5462:11–5463:8 (Jerath (Pls. Expert)); UPX8042 at -096 (Google Ads Help on Google Ads Tools). Thus, providing Search Ads further requires the infrastructure to offer advertisers the tools and data for setting up and managing advertising campaigns. Tr. 5458:23–5459:6, 5462:11–5463:8 (Jerath (Pls. Expert)); UPX8042 at -096 (Google Ads Help on Google Ads Tools). Importantly, these capabilities must allow advertisers, in real-time, to evaluate the performance of and make changes to their advertising. Tr. 5458:23–5459:6, 5462:11–5463:8 (Jerath (Pls. Expert)); UPX8042 at -096 (Google Ads Help on Google Ads Tools).

4. Distinct Prices And Sensitivity To Price Changes

443. Search Ads are generally priced by click while display ads are primarily priced by impression. *Supra* ¶¶ 101, 113; Tr. 1194:20–24 (Dischler (Google)) (display ads are primarily sold based upon impressions); *id.* 1196:5–14 (banner ads are sold predominantly based upon impressions).

444. [Intentionally Left Blank].

5. A Monopolist Of Search Ads Could Sustain Prices Significantly Above, Or Quality Significantly Below, The Competitive Level

445. Advertisers do not have reasonable substitutes for Search Ads to discipline a price increase or quality degradation. Tr. 5237:9–23 (Dijk (Booking.com)) (Booking.com cannot turn

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to other digital ads to reach the high-intent users it can with Search Ads). Facebook and other non-search digital advertising platforms do not constrain Search Ads pricing. *Id.* 5241:17–5243:17 (Booking.com advertises on Facebook, Instagram, and TikTok to drive awareness and consideration, but not to reach high-intent users); UPX0519 at .010–12 (summarizing an internal Google study that concluded that Search Ads CPCs are [redacted] times higher than Facebook social ads).

446. Non-digital advertising is not a reasonable substitute for Search Ads and, thus, not in the relevant market. Tr. 5279:23–5280:9, (Dijk (Booking.com)) (television advertising is higher in the funnel as compared to Search Ads and less effective than Search Ads); Tr. 3826:11–3827:11 (Lowcock (IPG)) (TV ads build awareness and interest that can then be converted to a sale when the user enters a query and is served a Search Ad).

6. The Advertising Industry Uses The Consumer Purchase Funnel

447. The consumer purchase funnel represents a conceptual framework of how consumers make purchase decisions. Tr. 1414:9–22 (Dischler (Google)) (the funnel is used in the advertising world and within Google as a construct for how advertisers think); Tr. 5381:6–20 (Jerath (Pls. Expert)). The concept applies to both products and services. *Id.* 5383:10–11.

448. Google itself uses the consumer purchase funnel, as shown below. UPX0427 at -030. Further, Google has touted the value of full-funnel marketing. UPX8051 at .001 ("Think With Google" post observing, "For years, [marketers] have heard that a holistic, full-funnel approach is critical for meeting customer where they are. Now we have the data to prove it.").

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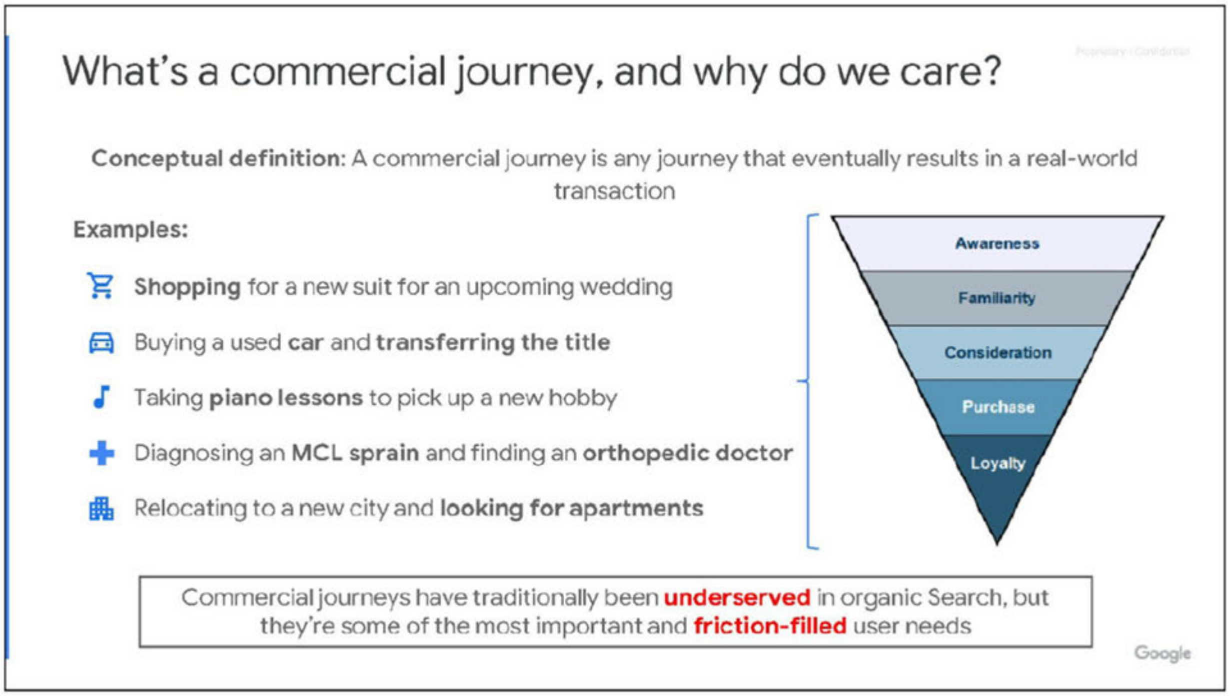
Figure 4: Example Of A Consumer Purchase Funnel



UPX0427 at -030.

449. Although different variations of the consumer purchase funnel appear in academia and in practice, they reflect the same fundamental ideas that consumers go through stages when making purchase decisions. Tr. 5383:12–22 (Jerath (Pls. Expert)); Tr. 3879:8–3881:14 (Lowcock (IPG)). For example, consumers need to be aware of a product before they can buy it. Tr. 3815:17–19 (Lowcock (IPG)); Tr. 5382:13–19 (Jerath (Pls. Expert)). The term "funnel" reflects "the successive narrowing" or "empirical generalization" that fewer people progress to each successive stage. Tr. 5382:20–5383:3 (Jerath (Pls. Expert)) (discussing UPXD103 at 6).

450. One example of the consumer purchase funnel presents four stages: awareness, interest, desire, and action, where (a) first the advertiser makes the consumer aware of its product, then (b) the advertiser gets the consumer interested in the product, then (c) the advertiser increases the consumer's desire for the product, and then (d) the consumer takes the

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desired action. Tr. 5381:21–5382:12 (Jerath (Pls. Expert)) (discussing UPXD103 at 6); Tr. 3879:7–3881:7 (Lowcock (IPG)).

451. The consumer purchase funnel does not presuppose strict linear progression through the funnel stages, and consumers can skip stages or go up and down the funnel. Tr. 6648:19–23 (Vallez (Skai)) (each consumer journey is unique and often non-linear); Tr. 3881:23–3882:16 (Lowcock (IPG)) (consumers can exit and enter the funnel at different points); Tr. 5383:4–09 (Jerath (Pls. Expert)).

a) The Consumer Purchase Funnel Is Widely Recognized And Used

452. Google and other companies that offer advertising products recognize and use the consumer purchase funnel. UPX0426 at -058; Tr. 8861:25–8862:7 (Israel (Def. Expert)) (consumer purchase funnel is "just sort of the lingo everybody uses," including Google when it speaks to advertisers); UPX0445 at -508 (marketing funnel used in 2016 by Facebook executives in internal communications). Similarly, advertisers and agencies recognize and use the consumer purchase funnel. Tr. 5238:3–5239:6 (Dijk (Booking.com)); Des. Tr. 45:4–46:16 (Alberts (Dentsu) Dep.) (noting "in the world of marketing, we often refer to the sales funnel"); Tr. 3814:25–3815:15 (Lowcock (IPG)); PSX00682 at -406–08 (using stages of the funnel in internal IPG training materials). Although an old concept, the consumer purchase funnel remains relevant today. Tr. 5240:9–16 (Dijk (Booking.com)) (The marketing funnel is "incredibly relevant" to analyze advertising even with the data now available.); Tr. 5381:6–20, 5384:5–5386:3 (Jerath (Pls. Expert)) (The funnel represents "timeless concepts that advertisers use." It is taught today in business schools, and new academic research is being published.).

[redacted]

b) Different Advertising Channels Align With Different Stages Of The Consumer Purchase Funnel

453. The consumer purchase funnel helps explain how different advertising channels align with different stages of the consumer purchase journey. Tr. 5383:23–5384:4 (Jerath (Pls. Expert)) ("[A]dvertisers can think of the goals that they need to meet for their campaigns and also sort of align which channels of advertising they would want to use to meet those goals."); Tr. 4848:23–4849:3 (Lim (JPMorgan)) ("Each media channel typically has its designated purpose."). The funnel also explains how advertisers vary their choice of channels depending on a particular campaign's goals and objectives. Tr. 5383:23–5384:4 (Jerath (Pls. Expert)); Tr. 3814:19–3815:13 (Lowcock (IPG)) (explaining "[o]rienting these campaigns with the customer journey is critical so that you can align all assets housed within the campaign to a common and consistent goal" in UPX0926 at -684); Tr. 6587:4–17 (Vallez (Skai)) (Skai aligns the different advertising channels/ad types (e.g., social, search), with the customer journey on the path to purchase); PSX00970 at -692–93, -696–67, -700–01 (ad agency client presentation, listing social ads for awareness and consideration (i.e., upper and middle funnel goals) and Search Ads for consideration and purchase (i.e., middle and lower funnels goals)).

454. For example, display ads and Search Ads work differently, with display ads helping to create demand, and Search Ads helping to satisfy demand. Tr. 453:23–455:3 (Varian (Google)) (discussing UPX0411 at -638); UPX0431 at -708 (same); Tr. 5122:1–20 (Booth (The Home Depot)) (Displays ads and Search Ads work together across the funnel.).As Google expert Dr. Israel concedes, advertisers see different types of advertisements forming different tools along the journey to try to accomplish the goal of making a sale. UPX1014 at -080 ("Though search and social both cater to massive, highly engaged audiences, they tend to serve very

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different purposes along the consumer's path to conversion."); Tr. 8863:8–8863:14 (Israel (Def. Expert)).

7. The United States Is The Relevant Geographic Market For Search Ads

455. The United States is the relevant geographic market for Search Ads. Tr. 4654:3–21 (Whinston (Pls. Expert)); UPX0342 at -870 (Search Ads revenue update breaking Search Ads revenue out separately by country, including United States).

C. Text Ads In The United States Compose A Relevant Market

456. General search text advertising (Text Ads) in the United States compose a relevant market. The Text Ads relevant market is contained within the Search Ads relevant market, but Text Ads is also a separate relevant market. Thus, every reason supporting Search Ads as a separate relevant market from other digital advertising and traditional advertising apply equally to exclude those advertising channels from the Text Ads relevant market. *Supra* ¶¶ 398–455 (§ IV.B).

457. Within Search Ads, Text Ads compose a distinct advertising channel. Tr. 5376:22–5377:10 (Jerath (Pls. Expert)) ("[G]eneral search text ads, or text ads for short, are a distinct product category of advertising[.]"); Tr. 4600:2–14, 4627:7–11, 4629:8–21, 4638:2–12 (Whinston (Pls. Expert)) (Text Ads in the United States is a relevant antitrust market; explaining what is in the Text Ads market, what is out (e.g., display, social ads), and why the market is unique); Tr. 1188:14–16 (Dischler (Google)) (Text Ads and shopping ads are different products).

1. Peculiar Uses And Characteristics

458. Text Ads are distinct from other types of Search Ads because Text Ads offer advertisers a broader scope of messaging, broader control, and better targeting options. Tr. 5432:3–14 (Jerath (Pls. Expert)); UPX0926 at -684–92 (IPG training materials discussing every way an advertiser can control when and under what circumstances its Text Ads will

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appear); UPX0412 at -919 ("We explicitly decided that there *was* going to be double serving between PLA and adwords text ads. Like Jerry said, PLAs are about specific products while [text] ads tend to be more general.").

459. Indeed, Text Ads have different inputs than other Search Ads, as reflected in the fact that Google runs separate auctions for Text Ads and other Search Ads like shopping ads. UPX0440 at -590 ("Do Product Ads participate in the AdWords [Text Ads] auction? Since Product Ads [PLAs] are a very different product-based ad format, we currently run a separate auction to determine the most relevant products to feature for a particular query."); Des. Tr. 144:7–11, 144:20–145:9, 145:14–147:10 (James (Amazon) Dep.) ("one of the motivating factors" behind Amazon creating different bidding systems for Text Ads and Shopping ads was the differences between the inputs for each ad type (discussing UPX0443 at -809)); Tr. 1197:9–13 (Dischler (Google)); Tr. 3812:9–15 (Lowcock (IPG)) ("separate auctions" for Text Ads and shopping ads); UPX6032 at -654–55 (Google admission (Resp. 11) that it has different auctions for shopping ads and for Text Ads.).

460. [Intentionally Left Blank]

a) Advertisers Have Greater Control Over When Their Text Ads Are Shown

461. Advertisers can select keywords and match types when bidding on Text Ads, which gives advertisers wide latitude in identifying when their Text Ads may be shown, whereas advertisers typically do not have the option to select keywords or match types when purchasing other ad types. In this way, Text Ads give an advertiser more control over when their ad appears on a SERP as compared to other Search Ads. Tr. 5432:10–5434:24 (Jerath (Pls. Expert)); Tr. 1185:7–15 (Dischler (Google)); UPX0926 at -688–93 (IPG training materials discussing how advertisers control when and under what circumstances Text Ads appear).

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462. Keywords and match types, selected by the advertiser, are a hallmark feature of Text Ads. Tr. 5432:15–5434:24 (Jerath (Pls. Expert)); Tr. 5129:4–24 (Booth (The Home Depot)) (with Text Ads the advertiser selects keywords, whereas shopping ads are matched based on a product feed); Des. Tr. 22:14–23:2 (Alberts (Dentsu) Dep.) (key distinction between Text Ads and PLAs is that Text Ads are purchased based upon keywords and PLAs are not); UPX0450 at .022 (ranking match types by scale (i.e., volume) and efficiency); UPX6032 at -653 (Google admission (Resp. 6): "Google admits that an advertiser may associate keywords with 'General Search Text Ads' in order to bid on such ads . . . ."); UPX0926 at -698 (IPG training materials noting that, because they are not keyword-based, shopping ads are "fundamentally different" from Text Ads).

463. As the Google Ads Help website explains, "[k]eywords are words or phrases that are used to match ads with the terms people are searching for." UPX8023 at .001; Tr. 5432:15–5434:24 (Jerath (Pls. Expert)). Advertisers bid on the keywords that they select, identifying a maximum bid. UPX0450 at .027–28 (IPG client presentation); UPX6058 at -002–03. When a consumer enters a query, Google decides which keywords match the query, which Text Ads can therefore enter the auction, and which ads are ultimately shown on the SERP. Tr. 5432:15–5434:24 (Jerath (Pls. Expert)) (discussing UPXD103 at 10); Tr. 1185:16–19 (Dischler (Google)) (Text Ads appear on the SERP in response to a specific user query when the query matches the keywords selected by the advertiser); Tr. 399:15–400:21 (Varian (Google)) (explaining that when a user enters a query, Google uses keywords provided by the advertisers to determine whether to show an ad in response).

464. With respect to match types, as the Google Ads Help website explains, "[t]he keyword match types dictate how closely the keyword needs to match with the user's search

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query so that the ad can be considered for the auction." UPX8023 at .001; Tr. 5432:15–5434:24 (Jerath (Pls. Expert)) (discussing UPXD103 at 10). Match types can thus extend or limit the number of queries to which the search engine matches to the keyword. Des. Tr. 28:3–31:6 (Alberts (Dentsu) Dep.). Indeed, "[t]he choice of match types can radically impact the amount of traffic a keyword will generate." UPX0926 at -691–92 (noting the importance of choosing the right match type); UPX0450 at .022.

465. For example, Google currently has three match types: (i) Exact Match, which matches based on "same meaning as your keyword"; (ii) Phrase Match, which "include[s] the meaning of your keyword"; and (iii) Broad Match, which "relate[s] to your keyword." UPX8023 at .001; Tr. 5432:15–5434:24 (Jerath (Pls. Expert)); Des. Tr. 28:3–31:6 (Alberts (Dentsu) Dep.) (the three most common match types from most restrictive to most liberal are Exact Match, Phrase Match, and Broad Match). Google determines the "boundaries" of each match type. Tr. 5432:15–5435:24 (Jerath (Pls. Expert)); DX0161 at -542 (expanding the boundaries to Exact Match to include semantic meaning).

466. By contrast, other Search Ads are matched to a consumer query by the search engine using different matching techniques. For example, for shopping ads on Google, advertisers submit a product feed to Google's Merchant Center. UPX8026 at .001 (Google Ads Help); UPX8039 at .001 (Google Ads Help); UPX8044 at .001 (Google Ads Help); UPX0926 at -698 (IPG training materials noting that "[t]o set up Shopping campaigns, . . . you will need a Product Feed which is typically uploaded into a Merchant Center"); Des. Tr. 27:2–17 (Alberts (Dentsu) Dep.) (shopping ads are "powered by a product feed"); UPX0440 at -590–91 ("Product Listings is a standalone format that requires no keywords or ad text and offer[s] advertisers a simple way to promote their entire product inventory.").

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467. Advertisers are only able to select product attributes for which their shopping ads may be entered into the ad auction. UPX8026 at .002 (Google Ads Help page explaining that "[i]nstead of keywords, Shopping ads use the product attributes you defined in your Merchant Center data feed to show your ads in relevant searches."); Tr. 1185:20–22 (Dischler (Google)) (unlike Text Ads, an advertiser does not choose keywords to determine when its shopping ads are shown); UPX6032 at -653 (Google admission (Resp. 5): "Google admits that an advertiser does not associate Product Listing Ads with keywords in order to bid on such ads.").

468. Google then decides how and where to show an advertiser's shopping ad using product details in the submitted data. UPX8026 at .002 (Google Ads Help); Tr. 4250:24–4251:9 (Juda (Google)) ("So with our product listing ads, the way that advertisers match searches is via Google matching user searches to a product feed that's specified by the advertiser."); Des. Tr. 153:14–154:16 (James (Amazon) Dep.) ("The primary difference between the text ads and the shopping ads auction is that the targeting is determined not by the keyword that we supply and the relevance . . . [to] the query entered by the user, but rather it is the—Google's determination of the query entered and its relevance to the product itself.").

469. As another example, with travel ads, Google does not use keywords but instead matches the consumer's query with Google's travel-ad inventory. Des. Tr. 26:5–14, 29:1–23 (Miller (Google) Dep.) (travel ads do not rely on keywords, but Google seeks to match them to query intent). Not surprisingly, advertisers consider the inability to use keywords as a significant limitation on Search Ads as compared to Text Ads. Tr. 5432:15–5434:24 (Jerath (Pls. Expert)); Tr. 1185:7–15 (Dischler (Google)); Des. Tr. 31:25–32:19, 33:20–34:14 (Alberts (Dentsu) Dep.) ("[I]t is a limitation that you cannot use keywords as a means of controlling the shopping ads themselves.").

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b) Advertisers Have Greater Control Over The Content And Appearance Of Their Text Ads

470. With Text Ads, advertisers typically control the ad copy and its components. Tr. 1184:16–1185:1 (Dischler (Google)) (advertisers provide the "creative fragments" for Text Ads); Tr. 423:15–25 (Varian (Google)) (advertisers choose the creative element for Text Ads but not for PLAs); Tr. 3810:9–23 (Lowcock (IPG)) (the advertiser determines every item depicted in UPX0012 at .004 ("Anatomy of [a Text] Ad")); Des. Tr. 47:9–48:10 (Alberts (Dentsu) Dep.) (Text Ads allow advertisers to draft ad copy "that aligns with their intentions and ambitions. So there is a liberty there to design and write ads that are . . . custom to that advertiser").

471. For other Search Ads, after the advertiser submits live inventory and pricing feeds, the search engine creates the ad copy based—in part—on that feed information. Tr. 3811:10–24 (Ramaswamy (Neeva)) (Shopping ads require a product feed, including images, and the advertiser needs to sell a product.); Tr. 1185:2–12, 1352:23–1353:11 (Dischler (Google)) (to create shopping ads, Google uses a product feed provided by advertisers that includes images, product attributes and descriptions, price, inventory, and maximum CPC bids); Des. Tr. 39:3–8, 39:11–40:7 (Fox (Google) Dep.) (PLAs draw their information from an advertiser's feed of product information); Des. Tr. 27:2–17, 66:25–67:15 (Alberts (Dentsu) Dep.) (shopping ads are "powered by a product feed" that Dentsu manages for clients and uploads in the Google Ads interface; hotel ads are also powered by a product feed like shopping ads).

472. By giving advertisers broad scope in what their ad message can be, Text Ads provide valuable flexibility. Tr. 5436:7–5437:2 (Jerath (Pls. Expert)) (discussing UPXD103 at 11 and explaining that Text Ads "giv[e] advertisers broad scope in what their message in the ad could be through the snippet," meaning advertisers have "some flexibility in the message, [and] they value that"). For example, the message could be an inspirational slogan, highlight a large

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upcoming sale or event with related details, or be broadly focused on a product category. *Id.* ("And you can see that . . . what's highlighted in red is a text ad. It has sort of a very broad scope in terms of the message. Like, the title itself is 'Innovation that wins,' which is kind of an inspirational slogan. So advertisers value that." (discussing UPXD103 at 11)); Tr. 5127:20–5128:17 (Booth (The Home Depot)) (discussing how a Text Ad can be used to promote a "very large Labor Day sale"); Des. Tr. 142:2–142:19 (James (Amazon) Dep.) ("If a user was on Google and performed the search 'robotic vacuum,' Amazon's text ad might trigger for that query when the text ad is targeting vacuums. So that text ad may be more broadly focused.").

c) Advertisers Can Use Text Ads To Advertise Virtually Anything

473. Advertisers can use Text Ads to advertise virtually anything, whereas other Search Ads can only be used to advertise tangible products or the specific subject matter of the specialized search engines.

474. Text Ads are available to advertise well beyond just tangible products. Tr. 408:10–13, 424:1–3 (Varian (Google)) (Text Ads can be used to advertise a wider variety of things beyond products); Tr. 3996:5–9 (Juda (Google)); Tr. 1180:7–24 (Dischler (Google)) (any type of advertiser can place a Text Ad on Google as long as the ad complies with Google's content policies"). For example, as Ryan Booth, Senior Manager of Paid Media at The Home Depot, noted, Text Ads can be used to advertise sales, home services offerings, The Home Depot brand, or "a very general query that we wouldn't be able to assign to any single product." Tr. 5127:20–5128:17, 5131:4–25, 5135:3–10 (Booth (The Home Depot)).

475. Other Search Ads can be used only to advertise tangible products or the specific subject matter of the SVP on which the ad appears. For example, shopping ads on Google are only available for retail advertisers selling products. UPX8026 at .001–02 (Google Ads Help page describing shopping ads); Tr. 1182:20–23, 1352:23–1353:11 (Dischler (Google))

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(advertisers selling services or something other than a product are not eligible to purchase a shopping ad on Google); Tr. 3998:7–9 (Juda (Google)) (shopping ads are only used to advertise products); UPX8026 at .001 (Google Ads Help page defining shopping ads as a more visual ad that retailers can use to promote online and local inventory). Indeed, financial institutions, such as JPMorgan, do not purchase shopping ads because they "represent[s] intangible products and services" and therefore they can only purchase Text Ads. Tr. 4848:5–11 (Lim (JPMorgan)). Similarly, Mr. Booth explained that The Home Depot has campaigns, such as for home services offerings, where it cannot purchase shopping ads because "[b]y definition of a shopping ad or a product listing ad, only products are eligible for that type of campaign." Tr. 5131:4–14 (Booth (The Home Depot)). For example, whereas an advertiser could use a Text Ad to advertise a store-wide Labor Day sale; the advertiser would not be able to use a shopping ad to do this. Tr. 5218:11–5219:5 (Booth (The Home Depot)) (The Home Depot would not be able to shift messaging about a Labor Day sale from a Text Ad to a shopping ad).

d) Advertisers Have Greater Flexibility Over A Text Ad's Focal Point

476. Text Ads can link to virtually any landing page the advertiser wishes. For example, the landing page could be a "category page" that features a multitude of different products. Tr. 5136:12–25 (Booth (The Home Depot)) (a consumer who clicks on a Text Ad would likely be taken to a "category page" that "would feature a number of different [products]"); Des. Tr. 135:10–25 (Raymond (Kohl's)) ("You might see a text ad that talks about patio furniture that will link to what we call -- a page that has this whole assortment versus, like, one specific product.").

477. Text Ads can further be customized using "formats" or "extensions," which are optional pieces of information that may be annotated onto Text Ads. Tr. 4254:3–6; 4254:19–4255:1 (Juda (Google)); Tr. 1347:24–1348:2 (Dischler (Google)) ("Extensions are

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augmentations to the basic text ad which provide structured information to the user"). Extensions can include site links, call extensions, seller rating, local information, and image extension. Tr. 1180:3–6 (Dischler (Google)); UPX0012 at .005; Tr. 1350:19–1351:7 (Dischler (Google)) (DXD-03 at .001–02 illustrates possible extensions that include a seller rating, sitelinks, local information and an image extension); UPX0001 at -536 ("Google Search Ads 101" noting especially for Text Ads on mobile devices "the addition of a location and call extension can be very relevant for users on the move or those hoping to place a quick call").

478. Other Search Ads have a more narrow messaging scope reflecting more rigid content restrictions, such as the fact that they are typically limited to showing one product per ad. Tr. 5436:7–5437:2 (Jerath (Pls. Expert)) (discussing UPXD103 at 11); Tr. 5136:12–13, 5137:1–7 (Booth (The Home Depot)) (explaining how a consumer who clicks on a PLA would "would go to a very specific single product page"). Thus, an advertiser's ad for a particular product may only show when the consumer's query is specific to the product (i.e., "Roomba robotic vacuums"), as opposed to more broadly focused, such as on a product category ("robotic vacuum"). Des. Tr. 142:2–142:19 (James (Amazon) Dep.). UPXD103 at 12 provides an example of a google.com SERP that reflects the flexibility advertisers have with Text Ads compared to the constraints on Google shopping ads. Tr. 5437:3–5438:4 (Jerath (Pls. Expert)) (discussing UPXD103 at 12).

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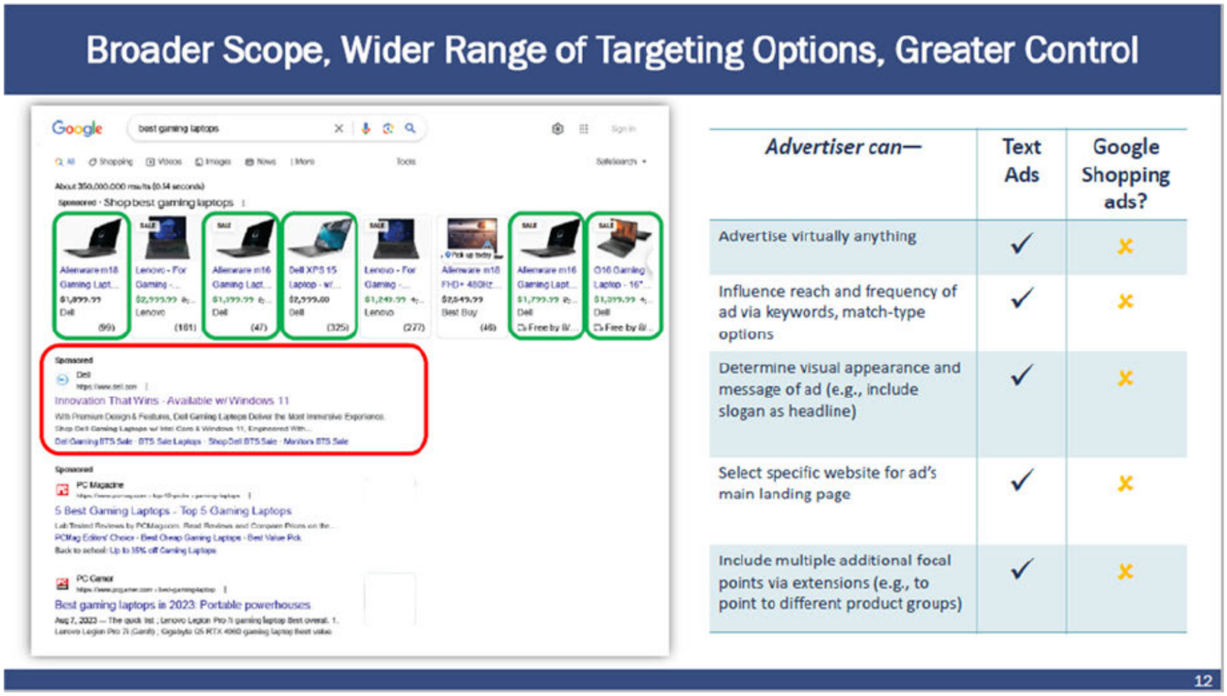
Figure 5: Text Ad Targeting Options



Source: UPXD103 at 12.

479. Although some other Search Ads may have some of the distinct attributes of Text Ads discussed above, none match Text Ads in all the above attributes, and they may come with other shortcomings. Tr. 5437:3–5438:4 (Jerath (Pls. Expert)) (discussing UPXD103 at 12). For example, Amazon permits advertisers to select keywords for their sponsored product ads, but the product being advertised must still be sold on Amazon. Tr. 5437:3–5438:4 (Jerath (Pls. Expert)) (discussing UPXD103 at 12); Tr. 5124:9–17 (Booth (The Home Depot)) (The Home Depot does not advertise on Amazon because The Home Depot does not sell products on the site); UPX0024 at -371 ("Amazon competes directly with many of our biggest PLA/shopping biz spenders - they will not spend with Amazon, and will continue to buy PLAs (e.g., Target, Home Depot)."). This reflects the fact that Amazon, like many other retailer specialized search engines, seeks to keep users on their platform or website, as opposed to leaving to the advertiser's own webpage. Tr. 1492:11–25 (Dischler (Google)); Tr. 3852:25–3853:11, 3857:18–3558:18 ((Lowcock (IPG))

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(search results on retailer websites (e.g., Amazon, Walmart) keep the user on retailer's site); Des. Tr. 27:25–28:1, 28:3–28:10 (Ramalingam (Yahoo) Dep.) (A "general search engine would provide answers without any specific restriction to a domain" and a "vertical one is going to be either focused on a particular domain or particular aspect of vertical").

2. Distinct Customers

480. Most advertisers on Google purchase Text Ads. Tr. 1476:25–1477:5 (Dischler (Google)). Many advertisers who purchase Text Ads do not purchase other Search Ads, such as shopping ads, the next most common type of Search Ad. Tr. 1181:3–6, 1181:11–13 (Dischler (Google)). In fact, most of Google's Search Ads revenue comes from advertisers who only buy Text Ads and not shopping ads: 52.8% of Google's Search Ad revenue comes from advertisers who purchase Text Ads but do not purchase shopping ads, whereas 46.9% of revenue is from advertisers that purchase both Text Ads and shopping ads, and 0.1% of revenue is from advertisers that purchase shopping ads but not Text Ads. Tr. 4649:2–15 (Whinston (Pls. Expert)) (discussing UPXD102 at 37).

481. This reflects the fact that most advertisers on Google cannot buy shopping ads because they are not selling physical products. Tr. 1183:13–19 (Dischler (Google)); Tr. 4848:5–11 (Lim (JPMorgan)) (JPMorgan only buys Text Ads because it sells intangible products); Tr. 4649:2–15 (Whinston (Pls. Expert)) (offering the example, "[s]o if MIT wants to advertise to attract students, MIT can't buy a PLA."). Indeed, of the 20 Google queries producing the most revenue for one week on September 2018, only three queries related to a physical product that could be advertised through a shopping ad, and all three queries related to a single product: iPhones. Tr. 7578:8–7579:19 (Raghavan (Google)) (explaining UPX0342 at -859). Similarly, if an advertiser is not offering travel services (e.g., lodging), it does not buy hotel or travel ads. Tr. 9285:19–9287:25 (Holden (Google)) (hotel ads are "attached to a particular property").

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482. Conversely, there are also advertisers buying Search Ads that do not buy Text Ads or prefer other Search Ads over Text Ads. For example, a significant source of Amazon ad revenue comes from advertisers without a website to link to, foreclosing Text Ads as an option. DX0231 at -568, -573, -583 (2021 Google presentation shows that most Amazon merchants do not have a website); Tr. 1435:9–11 (Dischler (Google)) (an advertiser needs a website to advertise on Google).

3. Industry Recognition

a) Google Considers Text Ads And Other Types Of Search Ads To Be Distinct And Complementary Products

483. Google views Text Ads as distinct from and complementary to other types of Search Ads. For example, an internal Google document dated November 11, 2010, around the time Google first launched shopping ads, describes shopping ads as "a very different product-based ad format" compared to Text Ads and explains that shopping ads and Text Ads "both supplement each other." UPX0440 at -590; Tr. 5438:5–18 (Jerath (Pls. Expert)) (discussing UPXD103 at 13). Another internal Google presentation from September 2010 confirms that shopping ads "[c]omplement[] text ads." UPX0464 at -155; Tr. 5438:19–5439:3 (Jerath (Pls. Expert)) (discussing UPXD103 at 14).

484. Within Google, the Search Ads team views Text Ads and shopping ads as "siloed in their own world" and not in competition with each other. Tr. 1190:9–1191:22 (Dischler (Google)); PSX00191 at -723. Dr. Varian conceded that shopping ads are a "different species" from Text Ads. Tr. 423:12–14 (Varian (Google)); Tr. 5439:4–8 (Jerath (Pls. Expert)) (discussing UPXD103 at 15).

485. Moreover, the same query can trigger separate Text Ads and shopping ads from the same advertiser, which will then enter the separate auctions. Tr. 1197:6–17 (Dischler

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(Google)). In fact, Google rejected integrating the Text Ad and shopping ad auctions because, among other reasons, "user intent and advertiser value is different across the units, and as a result advertisers are not bidding on the same thing on Shopping and Text ads, so query-level CPC equalization could lead to problems with one unit being too expensive." UPX1013 at .003 (discussed by Prof. Whinston at Tr. 4648:18–4649:1, referencing an excerpt in UPXD102 at 36).

486. Google recommends that retailers purchase both Text Ads and shopping ads. Des. Tr. 95:1–11 (McAteer (Google) Dep.). Google, however, does not recommend advertisers shift budgets between Text Ads and shopping ads. *Id.* 90:4–21 (as between Text Ads and shopping ads, "we [Google] never really necessarily recommended shifting budgets from one to another").

487. Google similarly treats Text Ads separately from hotel ads. Tr. 9228:24–9229:4 (Holden (Google)) (explaining that "Hotel AW text ads" refers to Text Ads that appear on the SERP and "Hotel Ads" refers to ads in the hotel unit on the SERP or in the Google hotel immersive); PSX00385 at -759 (Mr. Holden (Google) writing, "I want folks to understand that Hotel AW text ads and Hotel Ads are different things . . . ."). Google offers hotel ads to compete with online travel agencies and travel metasearch websites. DX0046 at -542, -545, -554–56, -580, -583 (A Google analysis of hotel and travel ads only compares Google's offering to travel SVPs (e.g., Kayak, Tripadvisor, Booking.com, Expedia, Orbitz), but not to any other GSEs.). Hotel ads revenue is incremental to Text Ads revenue. PSX00524 at -262 (based upon experiments, hotel ads are [redacted]% incremental to Text Ads, meaning Google would lose [redacted]% of hotel ads revenue if it only showed Text Ads).

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b) Advertisers And Other Industry Participants Consider Text Ads And Other Types Of Search Ads To Be Distinct And Complementary Products

488. Advertisers and other industry participants view Text Ads as distinct from and complementary to other types of Search Ads. For example, as an Amazon executive agreed, Text Ads and shopping ads serve different but complementary purposes. Des. Tr. 142:20–143:5 (James (Amazon) Dep.); *id.* 234:9–235:4 ("[T]here are going to be distinct advantages in one ad format over another where . . . it might not be able to satisfy [a particular customer] need. So there is an overlap of [Text Ads and shopping ads] in terms of how they serve the customer's needs, but there are edges where those ad units have their own specific incremental benefits.").

489. As Ms. Lim stated, "[p]aid search budgets are for paid search only," going on to state that "[t]hey are not fungible." Tr. 4856:16–4858:16 (Lim (JPMorgan)) (budgets are "not transferable between a programmatic buy across webpages and paid search. They are distinct and different and separate.").

490. As another example, Expedia does not consider its travel ads to be comparable to Google Text Ads, instead likening the travel ads to Google's meta product ads. Tr. 6574:15–6575:4 (Hurst (Expedia)). Other industry participants have expressed similar views. UPX0915 at -063 (Facebook document describing Google shopping ads and Text Ads as "two distinct products" that are "distinctly different"); Des. Tr. 47:9–10, 47:13–25, 48:2–3 (Stein (IAC) Dep.) (Angi considers portions of Google's business such as Local Service Ads and other units that "enable service professionals to reach consumers" to be its direct competitors); Des. Tr. 131:23–132:8 (Raymond (Kohls) Dep.) (agreeing that Text Ads and product listing ads serve different purposes, contrasting "the broader terms that are more relevant to text ads and then your product listing ads are very specific about one particular product").

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491. Advertisers can, and do, purchase both Text Ads and other types of Search Ads, including on the same SERP. Tr. 1183:22–25 (Dischler (Google)); Tr. 408:14–18 (Varian (Google)). For example, to advertise a product, retailers typically buy Text Ads and shopping ads on the same SERP. Des. Tr. 90:4–21 (McAteer (Google) Dep.)); Tr. 1354:18–1355:2 (Dischler (Google)) (DXD-03 at .001–02 shows a SERP with a Text Ad and PLA from Cole Haan); DXD-03 at .001–02; Des. Tr. 21:18–22:1 (James (Amazon) Dep.) (Amazon purchases Text Ads and shopping ads); Des. Tr. 22:14–23:2, 34:18–21 (Alberts (Dentsu) Dep.) (Dentsu places both Text Ads and shopping ads on Google and Bing, and advertisers purchase both Text Ads and shopping ads for the same set of products). Similarly, online travel agencies, travel metasearch sites, and suppliers (e.g., hotels) usually buy both Text Ads and hotel ads. Tr. 9196:18–22 (Holden (Google)); Tr. 5231:21–5232:1 (Dijk (Booking.com)) (Booking.com mainly buys Text Ads, but also buys hotel ads); PSX00192 at -020 (online travel agencies like Expedia, Hotels.com, and Booking.com get clicks through both Text Ads and hotel ads)).

492. Advertisers value having both Text Ads and shopping ads show on the same SERP because Text Ads and shopping ads provide consumers with different information. Des. Tr. 133:3–133:24 (Raymond (Kohl's) Dep.) (It is important for Kohl's to buy both search Text Ads and shopping ads because both work to drive Kohl's business in different ways.).

4. Uniqueness Of Production Facilities

493. Providing Text Ads requires additional infrastructure and capabilities compared to other Search Ads, including to match ads to queries based on advertiser selections for keywords and match types. *Supra* ¶¶ 461–469 (§ IV.C.1.a). As an example of the complexity of a Text Ad system, some advertisers have more than a billion keywords in Google's system, which exceeds the number of words in the English language. Tr. 1370:6–19 (Dischler (Google)).

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5. Distinct Prices/Sensitivity To Price Changes

494. Text Ads are generally more expensive than shopping ads. Tr. 1187:16–21 (Dischler (Google)) (referring to PSX00191 at -721 and confirming that at least as of October 2017, shopping ads were cheaper than Text Ads); Tr. 4649:25–4650:20 (Whinston (Pls. Expert)) (discussing UPXD102 at 39) ("text ads are more expensive than PLAs. . . . PLA prices have been flat or, if anything, a little decreasing, and text ad prices have been going up."); PSX00191 at -721;UPXD102 at 39 (Analysis of average annual cost per click for US queries from 2012 to 2021—Google and Bing Text Ads cost more than Google and Bing shopping ads and that the prices between the two types of ads have diverged over time).

495. Advertisers also pay more for Text Ads than display ads. Tr. 4641:1–23 (Whinston (Pls. Expert)) (discussing UPXD102); UPXD102 at 28 (advertisers pay much higher prices for Text Ads (an average of $[redacted] per thousand ad impressions (CPM) on Google and $[redacted] CPM on Bing) than for display ads (an average of $[redacted] CPM on Google DV360 and $[redacted] CPM on Google AdWords)). And changes to the pricing in the Text Ads auction do not affect pricing in the shopping ads action, nor do changes in pricing in the shopping ads auction affect pricing in the Text Ads auction. Tr. 1203:21–24 (Dischler (Google)).

496. Google's long-term advertising experiments show little advertiser substitution in response to increases in Text Ad prices. Tr. 4791:21–4793:1 (Whinston (Pls. Expert)) (Google found that the reduction in advertising in response to price increases was low enough that raising prices was profitable); Tr. 10480:5–10482:12 (Whinston (Pls. Expert))(Google performed an experiment—raising Text Ad prices for six weeks, sometimes by as much as 15%—and every time they found raising prices was profitable); UPX1054 at -057.

497. Advertisers who do not sell a physical product cannot shift advertising budget between Text Ads and other Search Ads. Tr. 7578:24–7581:17 (Raghavan (Google)) (reviewing

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UPX0342 at -859 and agreeing that companies that do not sell a physical product would not be incentivized to shift advertising budget between Text Ads and PLAs); Tr. 4848:5–11 (Lim (JPMorgan)) (JPMorgan does not purchase shopping ads because it "represent[s] intangible products and services" therefore can only purchase Text Ads); UPX0342 at -859.

6. A Monopolist Of Text Ads Would Be Able To Sustain Prices Significantly Above, Or Quality Significantly Below, The Competitive Level

498. Advertisers are not able to turn to reasonable substitutes for Text Ads to discipline a price increase or quality degradation. Tr. 5237:9–23, Tr. 5241:17–5243:17 (Dijk (Booking.com)) (Booking.com cannot turn to other types of digital ads to reach the high-intent users it can with Search Ads; Booking.com advertises on Facebook, Instagram, and TikTok to drive awareness and consideration, but not to reach high-intent users). For example, Mr. Lowcock considers Search Ads, specifically Text Ads, to be "mandatory" and has not recommended—nor would he recommend—that clients move spend away from Search Ads, even if the price of Google's Text Ads increased by 5%.. Tr. 3825:12–3826:15, 3827:20–23, 3837:25–3838:2, 3983:6–12 (Lowcock (IPG)).

499. Text Ads purchasers' lack of visibility into pricing mechanisms (nontransparent pricing) limits the purchasers' ability to respond to price and quality changes. *Infra* ¶¶ 713–724 (§ V.C.5.i); 1169–1192 (§ VIII.D.2*)*; Des. Tr. 189:6–16 (Miller (Google) Dep.) (SugarMaple format pricing launch was not disclosed to advertisers because "[s]omething that was not visual would have less need for comms," as opposed to "something . . . changing on the search page that's obvious, again, like an ad label."); Des. Tr. 188:13–20 (Miller (Google) Dep.) (explaining UPX2019 at -208 ("We are not currently planning on sharing comms or an impact list with sales—by all metrics and standards this launch is expected to have minimal impact on

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advertisers. That said, pricing changes are especially sensitive—so please don't communicate beyond this distribution")).

7. The United States Is The Relevant Geographic Market For Text Ads

500. The United States is the relevant geographic market for Text Ads. Tr. 4654:3–21 (Whinston (Pls. Expert)) (search results and advertisements served to consumers in the United States are distinct from those served in other countries).

D. Google Makes No Attempt To Identify An Alternate Advertising Market And Fails To Undermine The Search Ad And Text Ad Markets

501. Dr. Israel concedes he did not define the boundaries of any alternate advertising market (Tr. 8836:18–21 (Israel (Def. Expert))) and Google's various attempts to undermine the Search Ads and Text Ads markets cannot overcome the evidence showing those markets.

1. Advertisers' Use Of ROI/ROAS Metrics And Efforts To Optimize Ad Spend Across Channels Do Not Show That Advertisers View Search Ads And Other Ad Types As Substitutes

502. Although some advertisers seek to calculate ROI or ROAS from their digital advertising, and a subset of those consider ROI/ROAS as one factor when allocating spend between channels, this does not render all digital advertising interchangeable or part of the same market, nor does it mean plaintiffs' advertising markets are unsound. Tr. 5454:10–5455:15 (Jerath (Pls. Expert)) (to the extent advertisers "attempt[] to measure or use ROI/ROAS of different ad channels[, this] does not mean that these ad channels have really become interchangeable," discussing UPXD103 at 26); *id.* 5451:6–5452:14.

503. As Dr. Israel concedes, ROI/ROAS is "not the only thing" advertisers consider and advertisers would not shift all ad spend based on ROI/ROAS; instead he asserts that "partial substitution" based on ROI "is what matters." 8472:22–8473:20 (Israel (Def. Expert)).

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504. As discussed above, advertisers typically maintain separate budgets for Search Ads and other channels and do not shift between them. Tr. 4863:11–4864:9 (Lim (JPMorgan)) ("[W]e know what we need to spend in paid search, and it kind of exists in its own right and is not typically influenced by budgets from other channels."); Tr. 4856:16–4858:16 (Lim (JPMorgan)) ("Q. . . . And do you typically shift the spend between search text ads and digital display ads based on the -- if the relative cost of those ads would change? A. No. Q. And why is that? A. Paid search budgets are for paid search only. . . . [I]t is not transferable between a programmatic buy across webpages and paid search. They are distinct and different and separate. Q. And distinct in what way? A. They are not fungible. . . ."); Tr. 4862:7–14 (Lim (JPMorgan)) (JPMorgan does not shift spend between search and social channels based on relative cost of ads); Tr. 3960:12–3963:13 (Lowcock (IPG)) (even if Search Ads got more expensive "I've not had the experience where we would optimize away from search.").

505. Some advertisers do seek to calculate ROI and ROAS and consider those calculations when budgeting. But even the subset of advertisers that use ROI/ROAS to aid cross-channel budgeting, recognize the differing purposes of different digital advertising channels. Tr. 5458:13–22 (Jerath (Pls. Expert)) (noting that ROI is "just one input" into advertiser decisions). When assessing returns, advertisers do not view channels in isolation, but recognize that "more often than not, it's a combination of everything that you're doing that's driving th[e] outcome." Tr. 4893:8–4894:18 (Lim (JPMorgan)); Tr. 3980:4–3981:2 (Lowcock (IPG)) ("[Y]ou wouldn't necessarily move out of a channel that—that might individually look like it's not performing because you know it actually contributed to driving media performance elsewhere."). The interplay between channels drives budget allocations.

[redacted]

506. Some advertisers relying on "last click" ROI/ROAS recognize the interplay between channels by setting different ROI/ROAS targets for different digital channels, noting upper funnel channels can operate at a lower ROI/ROAS because they drive customers to lower funnel, higher ROI/ROAS channels. For example, Skechers—an advertiser whose documents both Plaintiffs and Google relied on[13] in support of their ROI/ROAS analysis—sets lower ROAS goals for advertising channels more suited to goals higher in the funnel, noting the importance of "giv[ing] mid funnel channels room to operate at a lower ROAS knowing they drive quality new customers who convert through other channels (brand search, direct, organic, email)." Tr. 5456:22–5458:11 (Jerath (Pls. Expert)) (analyzing UPXD103 at 27 (displaying UPX1017 at -395) and describing Skechers' use of ROI as "very representative").

507. Others use ROI to allocate budgets ***within*** the paid search channel but use different methods in other channels. Tr. 4863:3–4864:9 (Lim (JPMorgan)) (explaining budget for "paid search" built around ROI or net present value (NPV), while "[b]udgets for other channels are typically built around audience, the audience that you're trying to reach and how often you want to reach them over what period of time."). Still others use so-called "MMM" or "Media Mix Modeling" utilities, which are sophisticated programs that seek to "estimate the effect of various marketing inputs on sales and use these conclusions to recommend more effective distributions of marketing dollars on a more frequent basis." UPX0519 at .006; UPX0840 at -335 (MMMs "use statistical analysis to estimate the impact of marketing tactics, controlling for base drivers, on sales."). MMMs do not simply allocate across channels based on relative ROI, but consider a wide variety of factors, UPX0840 at -343 (illustrating other factors) and rely on

[13] Tr. 8472:22–8473:4 (Israel (Def. Expert)). Google did not enter the document discussed by Dr. Israel into evidence.

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extensive data over years involving a variety of inputs. UPX0028 at .041 ("MMMs generally require at least 1 year of data, preferably 2–3 years.").

508. Even moving spend across ad channels does not necessarily mean ad channels are interchangeable; for example, advertisers could rebalance ad spend as part of a full-funnel advertising strategy. Tr. 5454:18–5455:15 (Jerath (Pls. Expert)) ("[E]ven if spend is moved across [ad] channels, that does not necessarily mean that [ad] channels are interchangeable, they could still be complementary, but [an advertiser] can just rebalance to a full funnel kind of strategy" (discussing UPXD103 at 26)); *id.* 5455:16–5456:21 (explaining what he would expect an advertiser to do if it saw a decrease in ROI on Search Ads); *id.* 5459:7–5462:9 (responding to the Court's question regarding movement of funds from search to another channel and providing example to illustrate that "money has been moved from search to display, but not because the channels are substitutes or interchangeable, rather, because the channels are complementary and mutually reinforcing").

509. Advertisers set their budgets for channels for periodic cycles (i.e., quarterly or annually) and cannot quickly shift spend. Des. Tr. 150:8–151:3 (Jain (Google) Dep.) ("Budgets for advertisers are set on, I don't know, some cycle or so forth. They're not just instantly reactive").

510. Practical difficulties prevent many advertisers from shifting spend based on ROI/ROAS, even if they wanted to. The concept of calculating and using ROI/ROAS to assess advertising return is complicated, which is one reason why Google's internal documents state that "[i]n terms of spend allocation to competition, ROI is not what we should be worried about most." UPX0519 at .002. Calculating ROI requires measuring the incremental gain from an advertisement, *i.e.*, the amount of revenue generated by the advertisement. Tr. 8863:15–25

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(Israel (Def. Expert)). In the context of a single Search Ad, computing incrementality involves assessing what users would have done absent the Search Ad, *i.e.*, determining, absent the ad, which users would have clicked on an organic link or otherwise navigated to the advertiser's website. Tr. 8864:9–8866:6 (Israel (Def. Expert)) ("I pay some money on a text ad and I'd like to know if I didn't have it here, what would they have done. I don't ever know that perfectly. You try to measure that by doing A–B experiments with the ad, without the ad and compare, but it's an issue that needs to be studied."). It is progressively more difficult for advertisers using multiple channels and multiple ads within each channels; cross-channel ROI comparisons are particularly difficult. UPX0519 at -001 ("Cross channel ROI comparisons appear to still be extremely difficult today, even for major players.").

511. Thus, correctly calculating ROI/ROAS is a resource-heavy, operationally difficult, and expensive task that is not available to many advertisers. Tr. 5169:2–5170:6 (Booth (The Home Depot)) (outlining the "moderate to significant" internal and external resources, including both monetary and staffing, needed to conduct an incrementality test); PSX00676 at -240 (The Home Depot incremental test resulted in the loss of [redacted]% of revenues in the test markets.); Tr. 3981:7–20 (Lowcock (IPG)) (stating that ROI can be difficult (or impossible) for advertisers to measure); Des Tr. 118:7–119:10 (James (Amazon) Dep.) ("[V]iew-through effects that are difficult for us to measure. Meaning that a user who is on Facebook might see a Facebook ad but may not be inclined to click on it, but it may actually trigger some form of purchase consideration or brand awareness with Amazon that causes them to make a purchase with Amazon at a later date, which makes it difficult for us to measure the effects of the advertising program . . . .").

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512. Google's internal documents recognize that "cross channel ROI comparisons appear to still be extremely difficult today, even for major players." UPX0519 at .001; UPX0506 at .012 ("Overwhelming majority of adv[ertisers] nowhere close to measuring ROI."). And, although one of Google's employees testified (without support) advertisers' ability to track ROI has improved in recent years, Tr. 1385:3–12 (Dischler (Google)), recent privacy initiatives limiting advertisers' ability to track customers across channels has actually made it harder. Tr. 5453:4–5454:9 Jerath (Pls. Expert)) ("So to measure ROI, you need to be able to see what consumers do after you have shown them an ad. . . . And as consumer privacy concerns are increasing and consumer trackability is decreasing, it is more and more difficult to figure out that outcome."); Tr. 8864:1–8 (Israel (Def. Expert)) (acknowledging ROI measurement is a "challenge," "[d]ifficult to measure perfectly" and that "businesses tend not to perfectly know their ROI."); Tr. 8864:9–17–8865:6, 8866:14–19 (Israel (Def. Expert)) (conceding one difficulty with advertising ROI is figuring out how much revenue and cost was due to different advertisements and that "which advertisement may have led to the purchase" is "another challenge" and is among "things that need to be studied.").

513. Although Google presented testimony claiming it offered tools to smaller advertisers helping them calculate ROI, Google described only providing aggregated CPC information and clicks, which is insufficient to calculate incremental ROI. Tr. 7378:18–7379:15 (Raghavan (Google)) ("We can say we sent you so many clicks, here was the average price you paid, and now you go figure the rest, right."). And Google's documents recognize that "cross channel ROI comparisons appear to still be extremely difficult today, even for major players." UPX0519 at .001.

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2. Nike's Boycott Of Social Ads On Facebook/Meta Did Not Impact Search Ads

514. During a period when Nike boycotted Facebook/Meta and purchased no social media ads on its platforms, Nike's spend on Search Ads remained relatively unchanged compared to Nike's spend on social ads—(1) non-Meta social spend rose from 1% to 10% of Nike's advertising spend, dropping to only 7% after the boycott; (2) Search spend rose from 48% to 51%, remaining at 50% after the boycott; and (3) Display rose from 19% to 31%, dropping back down to 21% after the boycott. Tr. 8845:8–13, 8845:22–8846:8, Tr. 8847:13–16 (Israel (Def. Expert)) (discussing UPX2076 at -152, non-Meta social spend rose from 1% to 10% of Nike's advertising spend, dropping to only 7% after the boycott); Tr. 8848:14–23, 8849:9–15 (Israel (Def. Expert)) (discussing UPX2076 at -152, Search Ads spend rose from 48% to 51%, remaining at 50% after the boycott); Tr. 8849:22–8850:9 (Israel (Def. Expert)) (discussing UPX2076 at -152, display rose from 19% to 31%, dropping back down to 21% after the boycott); Tr. 8850:3–6 (Israel (Def. Expert)) (rise in display ads spend during Nike's Facebook boycott greater than rise in Search Ads spend).

515. During Nike's Facebook boycott, constraints on available non-Meta, social ads inventory impeded Nike's ability to increase spend on other platforms, causing shrinkage in Nike's overall social ads spend, with no corresponding significant increase in Search Ads spending. Tr. 8846:17–24 (Israel (Def. Expert)) ("During the pause, social investment shrunk by more than half of just 8 percent of overall PM budget allocation due to limitations on scale opportunities within SnapChat, Pinterest, and Twitter."); Tr. 8848:14–19, 8849:9–15 (Israel (Def. Expert)) (discussing UPX2076 at -152, Search Ad spend rose from 48% to 51%, remaining at 50% after the boycott).

516. [INTENTIONALLY LEFT BLANK]

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3. Google Markets "Performance Max" As A Complement To Text Ads And Repeatedly Admitted It Cannot Replace Text Ads

517. Performance Max is a relatively new Google product which automatically constructs and manages advertising campaigns across all of Google's advertising channels *(i.e.*, search, display, Discovery, Gmail, and others). Tr. 1371:25–1372:24, 1478:21–25 (Dischler (Google)); Tr. 7375:1–17 (Raghavan (Google)) (explaining DXD-21 at .018); UPX2079 *passim* (Google Ads Help: "About Performance Max campaigns"); UPX0028 *passim* (Google document for launch of Performance Max); Tr. 1289:1–12, 1480:20–1481:23 (Dischler (Google)) (Performance Max automatically creates and places ads on all Google properties).

518. As Jerry Dishler, Google's former head of ads, acknowledged, Performance Max is not a replacement for Text Ads or shopping ads. Tr. 1479:16–1480:19 (Dischler (Google)) ("Performance Max is not a replacement for text ads or shopping ads, correct? A. That's correct"). As both Mr. Dischler and Dr. Israel conceded, Performance Max is technologically incapable of replacing Google's Search Ads products, and Google therefore views it as complementary to its other Search Ads products. Tr. 1480:2–16 (Dischler (Google)); Tr. 8820:24–8821:19, 8825:15–8826:1 (Israel (Def. Expert)) ("[T]he artificial intelligence behind Performance Max is not developed to the point where it could take over all campaigns.").

519. Google instructs advertisers and its sales personnel that Performance Max does not replace, but complements, Text Ads and other Search Ads, recommending advertisers purchase both Text Ads and Performance Max. Tr. 8820:24–8821:19 (Israel (Def. Expert)) (responding to UPX2079 at -494, "Performance Max . . . is designed to complement your keyword-based Search campaigns."); UPX0028 at .026 ("We recommend adding Pmax as a complementary to search keywords campaign.") (emphasis omitted); *id.* at .047 ("[I]t is highly recommended that 'performance budgets' do not cannibalize Google Ads Search budgets as

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Performance Max is not a substitute for Google Search campaigns.") (emphasis omitted); UPX0931 at -075 (internal presentation instructing Google personnel to sell Performance Max "[a]s a complement to KW-targeted Search").

520. Performance Max users cannot select keywords to target Search Ads. Tr. 8827:20–8828:24 (Israel (Def. Expert)) ("You can't go into Performance Max and say, I want the following keywords"); UPX0028 at .023 ("Performance Max does not have keywords . . . .").

521. Google intends to continue selling Text Ads and shopping ads in addition to Performance Max. Tr. 1480:12–19 (Dischler (Google)).

V. GOOGLE'S MONOPOLY POWER IN EACH MARKET

A. Google Has Monopoly Power In The U.S. General Search Services Market

1. Google's High And Durable Market Share In General Search Services

522. In 2020, Google's market share for general search services in the United States was 89%. Tr. 4761:4–24 (Whinston (Pls. Expert)) (discussing UPXD102 at 47). Google's three much smaller rivals comprise the remainder of the general search services market in the United States: Microsoft's Bing (approximately 5.5%), Yahoo (2.2%), and DuckDuckGo (2%)). Tr. 4761:4–24 (Whinston (Pls. Expert)) (discussing UPXD102 at 47); Tr. 8922:3–5 (Israel (Def. Expert)) (*accord*); Tr. 3488:3–20 (Nadella (Microsoft)) (Bing is a "very, very low share player"); Tr. 2136:6–12 (Weinberg (DuckDuckGo)) (estimating DuckDuckGo's U.S. market share to be "two and a half percent").

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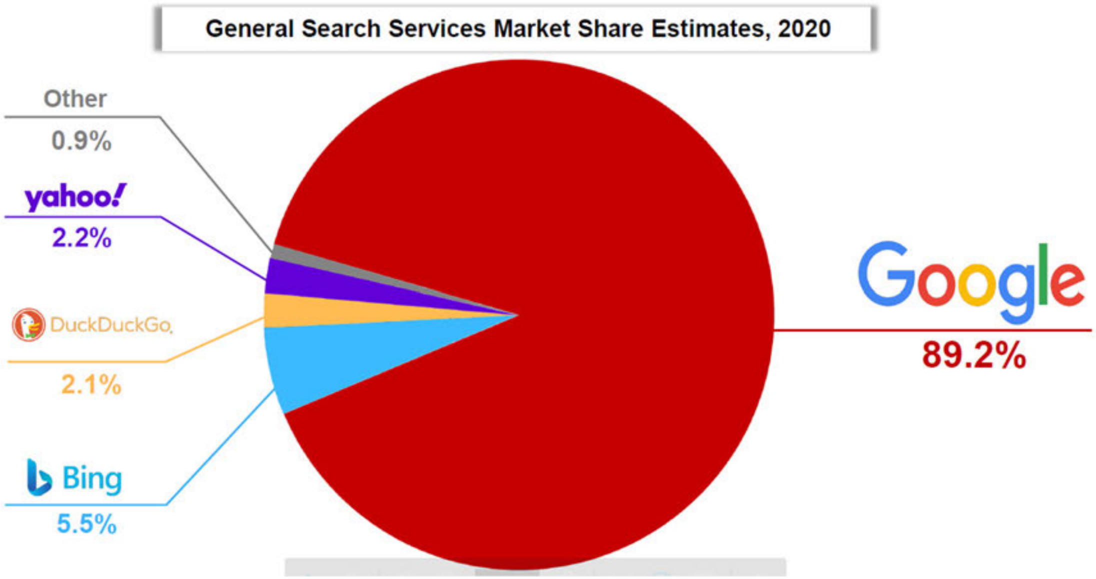
Figure 6: General Search Services Market Shares



UPXD102 at 47.

523. Prof. Whinston prepared these market share calculations relying on ordinary course data from Google and Microsoft and augmenting that with data from StatCounter. Tr. 4761:16–24 (Whinston (Pls. Expert)). StatCounter is an independent third-party source for market share analysis relied on, in the ordinary course, by both Google and other industry participants. Tr. 8684:12–18 (Israel (Def. Expert)) (StatCounter is a source of computing shares for GSEs); Tr. 3832:10–25 (Lowcock (IPG)) (StatCounter is a reliable source for search engine market share analysis); UPX0556 at -027–29 (Google email circulating StatCounter data for GSE market shares).

524. Google does not contest Prof. Whinston's market share calculations. Dr. Israel conceded that Google's market share for general search services is around 90%. Tr. 8921:20–8922:2 (Israel (Def. Expert)).

525. Google's general search services dominance is even greater on mobile devices, with a U.S. market share of 94.9%. Tr. 4762:19–4763:2 (Whinston (Pls. Expert)) (discussing

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UPXD102 at 49); UPX0341 at .030 ("Google's Search share on mobile is high, at 97%, while desktop is lower at 84%"). Google's advantage in mobile has grown its overall market share. Tr. 5798:17–5799:5 (Whinston (Pls. Expert)) ("it's important to remember mobile is where the market is growing" and desktop queries are "flat and have been for a long time"); Tr. 3098:6–3099:3 (Tinter (Microsoft)) (Google's superior position in mobile and mobile's growth as a source of user queries has "accelerated [Google's] market advantage").

526. Google's market share in general search services has been durable. Since 2009, Google's market share in general search services has risen from approximately 80% to nearly 90%. Tr. 4761:25–4762:17 (Whinston (Pls. Expert)) (discussing UPXD102 at 48) (using historical StatCounter data). Prof. Whinston confirmed the reliability of the historical shares from StatCounter by comparing them to historical ordinary course data from Google and Microsoft. Tr. 4761:25–4762:12 (Whinston (Pls. Expert)). Over the past decade, Bing and Yahoo's market shares have seldomly exceeded 10%. Tr. 4761:25–4762:12 (Whinston (Pls. Expert)) (discussing UPXD102 at 48).

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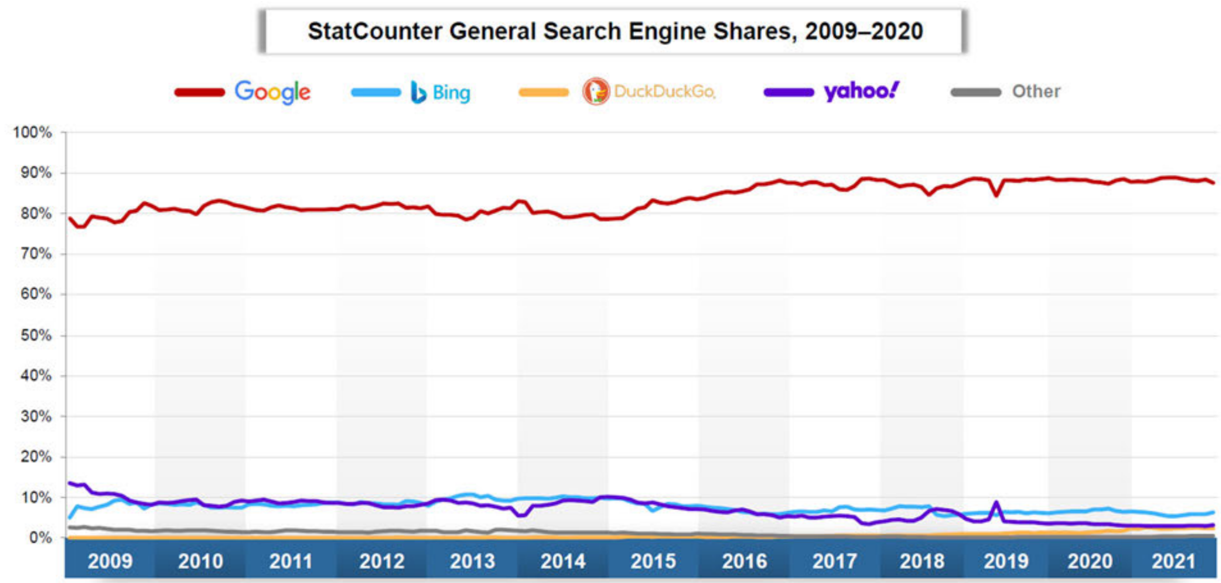
Figure 7: General Search Engine Shares



UPXD102 at 48.

527. Google's ordinary course documents confirm its high market shares for general search services. Between 2010 and 2013, Google monitored its U.S. search engine market share monthly and found that the company held greater than 75% of the market. UPX7001 (FRE 1006 summary of monthly Google internal search share calculation emails); Tr. 203:3–11, 209:3–210:4 (Varian (Google)) (Google's monthly share reports are reliable and created by Google statisticians); Des. Tr. 196:20–197:7 (Chu (Google) Dep.) (email reports summarized in UPX7001 were Google statisticians' best efforts to provide accurate reporting). These monthly market share reports were circulated to Google's OC, a group of top executives. Tr. 205:18–206:10 (Varian (Google)) (reviewing UPX0472).

528. Similarly, between 2017 and 2019, Google employees prepared regular "Global Ads Financial Factpacks," which reported that the company's general search market share regularly exceed 80% on desktop and reached as high as 98% on mobile. *E.g.*, UPX1075 at -112 (Google had 83% desktop search query share and 97% mobile search query share in 2017Q4);

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UPX1071 at -209 (Google had 85% desktop query share and 98% mobile query share in 2018Q4); UPX1073 at -221 (Google had 84% desktop query share and 98% mobile query share in 2019Q2)[14]; Tr. 8682:4–8683:20 (Israel (Def. Expert)) (discussing UPX0475). Data prepared for a July 2021 Google Board of Directors meeting reported Google as having 84% and 97% query share in the United States on desktop and mobile, respectively. UPX0909 at -168. Third parties similarly recognize Google's high market share for general search. UPX0450 at .016 (IPG client presentation "Paid Search 101" showing Google's market share at 88.43% and explaining in the "Market Share for Search Engines in the USA . . . It Isn't Even Close."); Tr. 3833:4–20, 3834:2–18 (Lowcock (IPG)).

529. Recent industry events, such as the release of ChatGPT and OpenAI's partnership with Microsoft, have not affected Google's high market share. Tr. 7533:6–7535:19 (Raghavan (Google)) (agreeing that ChatGPT "hasn't put a dent in Google's market share"); Tr. 3532:5–19 (Nadella (Microsoft)) ("Q. And one quote I wanted to ask you about, I think at one point you said that 'ChatGPT or Bing chat is going to make Google dance.' Do you remember that? A. Yeah. I mean, look, let's call it exuberance of someone who has like 3 percent share that maybe I'll have 3.5 percent share").

530. Output growth can occur even in monopolized markets. Tr. 10456:17–10458:18 (Whinston (Pls. Expert)) (discussing markets where courts concluded that dominant firms held

[14] Additional Financial Factpacks: UPX2007 at -659 (2017Q1); UPX2008 at -640 (2017Q2); UPX2009 at -265 (2017Q3); UPX1076 at -651 (2018Q1); UPX0475 at -744 (2018Q2); UPX1074 at -166 (2018Q3); UPX1072 at -742 (2019Q1); UPX0476 at -668 (2019Q3).

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monopoly power even though output was increasing, such as oil production in the *Standard Oil* decision and PC shipments in *Microsoft*).

2. Barriers To Entry In General Search Services Are High

a) Complexity And Cost Of Constructing A General Search Engine Are Significant Entry Barriers

531. Building a GSE requires crawling the web, constructing an index, developing a search function capable of retrieving and ranking the websites, and displaying results through a SERP accessible to consumers. *Supra* ¶¶ 57–72 (§ III.A). A GSE must search and present responses to queries from the trillions of documents on the internet. Tr. 6302:14–20 (Nayak (Google)) (discussing DXD-17); Tr. 3699:17–3701:12 (Ramaswamy (Neeva)).

532. To be viable, a GSE must first crawl a vast amount of the web and log information on websites to build an index. *Supra* ¶ 67. Web crawling of that magnitude requires a "huge set of computers." UPX8052 at .002.

533. Crawling a webpage imposes financial and resource costs on the webpage owner. Tr. 6309:4–6310:5 (Nayak (Google)) (crawling a webpage uses that page's resources). Accordingly, GSEs often need permission to crawl webpages from page owners, some of whom only give permission to large GSEs. Tr. 2656:19–2658:24 (Parakhin (Microsoft)) (webmasters often give priority for crawling to search engines with greater scale); UPX8052 at .002 (some website owners prohibit crawling on their webpages). Webpage owners will often allow only Google or the most popular search engines to crawl their page and disallow crawling by everyone else—even established competitors. Tr. 2656:19–2657:24 (Parakhin (Microsoft)) ("It is fairly standard practice often to go and allow [sic] most popular search engines, and just disallow everybody else"); Tr. 2666:21–2667:12 (Parakhin (Microsoft)) (a large e-commerce site in

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Turkey blocked crawling by all GSEs except Google, which made Yandex's results "very uncompetitive").

534. Indexing is the process of converting the web crawl into a database organized to allow the GSE to efficiently return responses to user queries. *Supra* ¶ 68.Because of the internet's massive volume, determining how to index it is "a real challenge." Tr. 6302:21–6303:1 (Nayak (Google)). Most good engineers "would basically give up on" crawling and indexing the web "before they start, because it is a Herculean problem." Tr. 3699:13–3701:12 (Ramaswamy (Neeva)).

535. The sheer size of the internet and the amount of spam and poor-quality content means that a GSE cannot store all webpages in an index; a viable GSE must instead understand what to index and how to organize the index's contents. Tr. 6303:2–6304:21, 6309:4–6310:5 (Nayak (Google)). A web index must be comprehensive enough to answer user queries, even uncommon queries in the long tail. Tr. 6303:2–25, 6308:12–6309:1 (Nayak (Google)); *infra* ¶¶ 985–1006 (§ VIII.A.2.a.i–ii). The index must also remain current, requiring crawlers to work constantly. Tr. 6304:1–21 (Nayak (Google)) ("[I]f you want to search the web effectively, you need to keep your index up-to-date."); Tr. 2251:19–23 (Giannandrea (Apple)). *infra* ¶¶ 1006–1010 (§ VIII.A.2.a.iii).

536. Retrieval and ranking—the final "crucial" steps for operating a GSE—are the "hardest problem[s] in search." Tr. 2253:15–2255:3 (Giannandrea (Apple)); Tr. 6330:25–6332:18 (Nayak (Google)); *supra* ¶¶ 70–71. Because as many as 10 million results could match a query, a search engine must quickly rank webpages that are most responsive. Tr. 6330:25–6332:18, 6398:25–6399:9 (Nayak (Google)); Tr. 2253:15–25, 2254:10–14 (Giannandrea (Apple)).

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537. In addition to the technical complexity of these tasks, building, maintaining, and growing the component parts of a GSE—the crawler, the indexer, and the retrieval and ranking mechanisms—requires significant capital investment; this too acts as an entry barrier. Tr. 4764:1–4765:6, 4765:12–25 (Whinston (Pls. Expert)); Tr. 2267:17–2268:7 (Giannandrea (Apple)) (building a competitive GSE is "very expensive."); Tr. 6304:22–6305:3 (Nayak (Google)) (indexing alone requires "a very significant cost" for machines, bandwidth, and data storage).

538. The "depth of R&D needed" to build and maintain a GSE is an entry barrier that has resulted in "few serious contenders" in general web search. UPX0266 at -983. Microsoft has invested approximately $100 billion in Bing during the past two decades. Tr. 3510:16–23 (Nadella (Microsoft)); Tr. 2682:10–15 (Parakhin (Microsoft)) ("Bing made tremendous efforts over the years. Like empirically speaking, no other company could or did afford the amount of investment that was needed to stay viable at the level of scale that Bing had."). As estimated by Google's former head of search, Mr. Giannandrea, "a world class search engine is at least a $2–4B/year investment and that is before you build a search ads business to pay for it." UPX0266 at -986; Tr. 2295:3–16 (Giannandrea (Apple)) (Apple's finance team concluded that an Apple search product would cost $6 billion in annual serving and operating costs.); UPX0460 at -177; DX0374 at -301 (Mr. Giannandrea advised Apple CEO Tim Cook against acquiring Bing because it would be a "multi billion dollar investment."). Google estimated that it would cost Apple $10 billion annually to operate its own GSE. Tr. 1650:5–1653:11 (Roszak (Google)) (discussing UPX0002 at -392–93).

539. Venture capital funding is also difficult to obtain for general search. UPX0240 at -507 ("[T]he reason a better search engine has not appeared is that it's not a VC fundable

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proposition even though it's a lucrative business."); Tr. 5848:15–5949:1 (Whinston (Pls. Expert)) ("[Y]ou see this sometimes in references like, oh, search is a place that venture capital does not go").

540. Overcoming the cost and complexity of building a GSE is necessary but not sufficient to ensure successful entry into the general search services market, as evidenced by the recent exit of Neeva. Dr. Ramaswamy, who had worked at Google for fifteen years and risen to lead the company's search infrastructure team, started Neeva with two other former Google employees and was backed by two substantial funding rounds. Tr. 3667:3–3668:15, 3669:15–3670:5, 3672:6–13, 3674:16–3677:10 (Ramaswamy (Neeva)). Neeva sought to differentiate itself by being ads-free, privacy-focused, and offering a more personalized experience using generative AI. Tr. 3718:25–3719:16 (Ramaswamy (Neeva)); UPX0940 at -490–91. Despite raising a substantial amount of money, having engineering prowess, and peaking at several million monthly active users, Neeva was unable to compete in the general search services market. Tr. 3674:16–3675:6, 3699:13–3701:12, 3710:15–3712:20, 3734:12–3735:10 (Ramaswamy (Neeva)). As Dr. Ramaswamy explained, "if a well-funded and exceptionally talented team like Neeva could not even be a provider on most of the browsers, I don't see that as the market working." Tr. 3723:22–3724:23 (Ramaswamy (Neeva)).

b) Acquiring Scale Necessary Is A Significant Entry Barrier

541. The need to acquire scale is a significant barrier to entry. Tr. 4766:10–15, 5781:8–5782:8, 5783:15–20 (Whinston (Pls. Expert)). Scale is vital for improving search and ad quality. *Supra* ¶¶ 978–1066 (§ VIII.A). Increased search quality attracts additional users, and advertisers follow users. *Infra* ¶ 587. Additional users and advertisers result in increased revenue, which increases the resources available for distribution. *Infra* ¶¶ 798–817, 1093–1101. That is, these

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additional resources lead to additional scale and search quality, again, attracting more users and fueling a cycle of improvement. *Supra* ¶ 193.

542. Without access to scale, rivals' ability to compete is directly and indirectly weakened. Tr. 5781:8–5782:8, 5783:15–20 (Whinston (Pls. Expert)) ("If rivals have reduced scale, that can directly reduce the quality of their search services and their ad as well. So they—basically, reduced scale directly weakens rivals as competitors."). The need to acquire scale to build a quality search engine is a significant barrier to entry. *Id*. 4766:10–15, 5781:8–5782:8, 5783:15–20.

c) Brand Recognition And Consumer Loyalty Are Significant Entry Barriers

543. Google's strong brand recognition and consumer loyalty create an entry barrier. Des. Tr. 91:18–92:8 (van der Kooi (Microsoft) Dep.) ("[I]t was very hard to market against something that is a brand name already out there and to then drive usage from TV commercials."). To *"Google"* is a verb. Tr. 3547:19–22 (Nadella (Microsoft)); Tr. 622:25–624:4 (Rangel (Pls. Expert)); Tr. 4769:10–16 (Whinston (Pls. Expert)) ("Being a verb helps"). The Google brand is so entrenched that users "generally blame themselves and try and reformulate their query" when they are dissatisfied with search results. Tr. 3741:3–3742:16 (Ramaswamy (Neeva)); Tr. 3491:23–3493:8 (Nadella (Microsoft)) ("[W]ith search in particular . . . once you have dominant share, users are just most familiar with your user experience, and change is hard."). This affords Google stickiness and latitude among users that Google's competitors do not enjoy. Tr. 3741:3–3742:16 (Ramaswamy (Neeva)).

544. When Google implemented a choice screen on Android devices in Europe, Google's brand recognition helped minimize defection. Tr. 622:25–625:14 (Rangel (Pls. Expert)); UPX1103 at -775 ("The reason the financial impact is not shifting based on the

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placement of Google in the choice screen is because the assumptions we used in the model are based on brand recognition (using queries as a proxy)–considering this is what the assumption is meant to capture, the position wouldn't matter as much as the recognition would.").

545. Google's "very strong brand recognition" is "something that a new entrant would need to overcome" and is a significant entry barrier. Tr. 4766:2–9 (Whinston (Pls. Expert)).

d) Google's Control Of Search Access Points Through Its Exclusionary Contracts Is A Significant Entry Barrier

546. Google's search distribution contracts with Apple, Mozilla, and Android OEMs and carriers are a significant barrier to entry.

547. Default placement in a search access point is by far the most effective method of driving traffic to a GSE and accounts for the overwhelming majority of a GSE's search queries. *Infra* ¶ 883. Most search traffic reaches a GSE through defaults; organic queries account for only a small percentage of traffic. *Infra* ¶ 883. Other distribution methods—such as marketing and downloads in app stores—are ineffective compared to default distribution. *Infra* ¶¶ 880–881. Google's agreements raise users switching costs, *infra* ¶¶ 891–913 (§ VI.D.3.C), and make entry and expansion more difficult by ensuring that rivals are excluded from search access points, *infra* ¶¶ 546–549 (§ V.A.2.d).

548. Google's Android partners told Dr. Ramaswamy that Google's contract made it "very, very hard" for them to offer Neeva as an option for the search engine default on devices they controlled. Tr. 3691:18–3692:12 (Ramaswamy (Neeva)); UPX0957 at -881 (Distribution

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partnerships with OEMs have "Search Defaults" locked-in with Google); UPX0958 (partners' spreadsheet detailing Neeva's unsuccessful efforts to secure distribution with Android carriers and OEMs). The absence of Neeva as an option for search defaults on major browsers and operating systems was one reason Neeva exited the general search market. Tr. 3690:5–3691:9, 3699:13–3701:12 (Ramaswamy (Neeva)).

549. Google's contracts with Apple, Mozilla, and Android OEMs and carriers make entry more difficult by ensuring that rivals are excluded from search access points. Tr. 4767:7–4767:15 (Whinston (Pls. Expert)) (discussing UPXD102 at 51). Forcing rivals to less effective distribution channels raises the cost of entry and expansion. *Id*.

e) Google's Control Of The Default On Chrome Is A Significant Entry Barrier

550. Almost one-fifth of all general search queries in the United States go through the default on user-downloaded versions of Chrome (e.g., Chrome on Windows and Apple devices). *Infra* ¶ 968. Google, as the Chrome's owner, always sets itself as Chrome's default search engine. *Infra* ¶ 969. Google's ownership of Chrome and control of the default on Chrome is thus a barrier to entering the general search services market because rivals have no opportunity to attain default distribution for almost one in five U.S. general search queries. Tr. 4766:24–4767:5 (Whinston (Pls. Expert)) (discussing UPXD102 at 51).

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f) Syndicated Entry Does Not Offer A Meaningful Workaround To Entry Barriers

557. Search syndication, *supra* ¶ 74–76 (§ III.B.1.a), does not offer a meaningful workaround to entry barriers because options are limited and there is no opportunity to innovate. In 2019, when considering syndication partners, DuckDuckGo was limited to Google, Bing, and DuckDuckGo's then-partner Yahoo, which itself syndicates from Bing. Tr. 2061:18–2062:9 (Weinberg (DuckDuckGo)). [redacted] DX1037 at -439–40.

558. Neeva built its own search technology in part because it "felt that [it] could not innovate as much as [it] wanted to on top of" Bing's syndicated feed. Tr. 3739:20–3740:7 (Ramaswamy (Neeva)).

3. Google's Quality And Monetization Advantages Are Evidence Of And Contribute To Its Monopoly Power In The General Search Services Market

a) Google's Quality Advantage Is Evidence Of And Contributes To Its Monopoly Power

559. Google's search quality advantage over rivals is evidence of and contributes to its monopoly power. Tr. 4767:17–4769:13 (Whinston (Pls. Expert)). One way Google measures its search quality against its competitors is by usings a pool of paid human raters to evaluate search results. UPX0872 at -848; Tr. 1779:21–1780:1 (Lehman (Google)); Tr. 8099:14–25 (Gomes (Google)). To do this, Google will "sample user queries, send these queries as well as Google or Bing results to [Google] raters and ask them to rate how good a result is for a query." UPX0872 at -848; Tr. 6323:19–6324:24 (Nayak (Google)). Each of the queries evaluated by a human rater will individually be given an "Information Satisfaction," or IS, score. Tr. 1779:21–1780:1, 1813:6–1814:4 (Lehman (Google)). Individual IS scores are then aggregated over all the queries

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in the experiment and Google rolls them up into a score between 1 to 100. Tr. 1813:6–1814:4 (Lehman (Google)) (IS scale is 0 to 100); UPX0872 at -848 (Google, "then . . . roll[s] up all these assessments into a metric for tracking and experimentation."). To conceptualize what one-point means on this scale, Google notes that removing Wikipedia—"a really important source on the web"—results in an IS loss of roughly a half point. Tr. 6323:6–18 (Nayak (Google)) ("So that gives you a sense for what a point of IS is. A half point is a pretty significant difference if it represents the whole Wikipedia wealth of information there. So that's how we've been thinking about it."). On an annual basis, Google usually attempts to improve its quality by 1 IS point. Tr. 1812:12–20 (Lehman (Google)) (one-point IS gain is a good yearly goal); UPX0217 at -792.

560. In 2020, on mobile Google outperformed Bing, its next closest competitor, by approximately about four IS4@5 points. UPX0268 at -122; Tr. 1779:1–1780:1 (Lehman (Google)) (IS4 indicates the fourth version of the IS metric.); *id.* 1814:11–1814:14 ("[T]he 'at' usually refers to the number of results that are being evaluated." For example, IS4@5 means that human raters evaluated the top five results.). This IS score gap represents a "fairly meaningful difference in quality" of at least 8 Wikipedia points. Tr. 6323:6–18, 6369:6–12 (Nayak (Google)). Google has maintained its quality lead for a prolonged period. Tr. 4768:5–4769:9 (Whinston (Pls. Expert)) (referencing UPXD102 at 55, "[b]etween 2015 and 2021, the difference in the US between Google's and Bing's IS scores ranged from ~3 to 8 points"); Tr. 8100:19–21 (Gomes (Google)) (agreeing that during his time heading search, the IS4 rankings between Google and Bing, Google always had a higher ranking). Google also maintains a quality lead in important segments like tail queries which make up a large portion of the overall query stream. *Infra* ¶¶ 981–982, 990 (empirical analysis showing Google's IS score advantage particularly in tail queries), ¶¶ 991, 995–997, 1000–1001. Google's quality advantage contributes to and is

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evidence of its monopoly because it allows Google to retain users by simply being "good enough" (because "good enough" is still better than rivals) rather than improving the quality of its product as it would in a competitive market. Tr. 4767:16–4768:4 (Whinston (Pls. Expert)).

b) Google's Monetization Advantage Is Evidence Of And Contribute To Its Monopoly Power

561. Google has had, and maintains, a monetization advantage over its rivals—particularly Bing and particularly on mobile. UPX0014 at -984 (discussing Bing's "RPM gap relative to Google" and "significant headroom for RPM growth"); Tr. 4769:17–4770:22 (Whinston (Pls. Expert)) (referencing UPXD102 at 55–56, illustrating the RPM gap between Google and Bing over time). In fact, the RPM gap between Google and Bing on mobile has grown over time as Bing has continued to lack access to mobile defaults. *Id.* Illustrated differently, Google had a massive [redacted]% profit margin on Search Ads in 2022, which was consistent with its profit margins for the preceding decade. *Infra* ¶ 598.

562. As Microsoft explained to Apple in 2016, Microsoft's search and ads syndication deal with Yahoo in 2010 demonstrated that scale was a critical reason for the RPM gap and "adding volume to [Bing's] search ads marketplace from Apple devices will increase revenue per search." UPX0246 at -255; *id.* at -260–61 (explaining the direct scale impact on RPM as a result of Microsoft's 2010 partnership with Yahoo); *infra* ¶¶ 1062–1066, 1078 (Microsoft discussions with Apple about benefits of attaining query volume from Apple devices). In general search services, unlike in many other product markets where dominant firms may have cost advantages, this significant negative marginal cost advantage for Google over its rivals, particularly in mobile, is evidence of and contributes to Google's market power. Tr. 4767:17–4770:22 (Whinston (Pls. Expert)). For example, because of Google's monetization advantage, Microsoft's 2016 offer of 90% revenue share to Apple was "not really interesting" compared to Google's

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offer of just 40% revenue share. Tr. 2510:19–2511:11 (Cue (Apple)); *infra* ¶¶ 1263–1272. Google's monopoly is insulated from meaningful competition when its rivals must offer all, or almost all, of their Search Ads revenue to win default distribution.

4. Direct Evidence Of Google's Monopoly Power In The General Search Services Market

a) Google Extracts Private User Data Beyond What It Knows Users Prefer

563. Google's ability to ignore competition in privacy and maintain policies and practices that are contrary to consumer desires for increased privacy in search is direct evidence of its monopoly power. Tr. 5854:11–5856:14 (Whinston (Pls. Expert)) (Google's monopoly enables it to offer users less privacy than it would in a competitive market).

564. Privacy is an important dimension of competition for GSEs. *Infra* ¶¶ 1137–1139. Senior Google executives, however, have refused to adopt additional privacy improvements because they do not perceive a risk of losing users to competing GSEs due to privacy considerations; rather, Google acts only if a privacy deficiency will actually lead to fewer queries. *Infra* ¶¶ 1143–1146. Google would "never" choose a privacy default "based purely on what users tell us in survey research." Tr. 9057:9–9058:2 (Fitzpatrick (Google)). Rather than compete on privacy, Google accepts that there are "huge gaps" between the privacy protections that it offers compared to those of rivals like DuckDuckGo. UPX0811 at -420, -423, -445; Tr. 2063:24–2064:4 (Weinberg (DuckDuckGo)) (DuckDuckGo collects only anonymized search data and deletes the data).

565. Instead of improving privacy in response to competition, Google maintains privacy policies and practices that dissatisfy its users. Tr. 7453:12–7454:4 (Raghavan (Google)) (Google performed poorly on data privacy and data security in a user survey, which were the most important attributes for user trust); DX0183 at .015 ("Google had weak performance scores

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on top drivers across all 4 markets"; showing Google's U.S. performance scores of 24% for both "[r]espects my privacy" and "[k]eeps my personal data secure"); *id.* at .004 ("Security and Privacy are most important drivers of trust in Search. However, we perform poorly on these four attributes across all 4 markets"); UPX1069 at -661–62 (privacy concerns were the biggest contributor to declining user trust in the Google brand).

566. By default, Google retains 18 months of user search history and web activity; Google allows users to change this setting, but only offers 3 months or 36 months of data retention as alternatives. *Infra* ¶¶ 1152–1153. Google set its default data collection at 18 months for no reason other than that 13 months "just felt like a really weird number." Tr. 9012:21–9013:18 (Fitzpatrick (Google)). Similarly, Google considered implementing a "slider" that would allow users to select any duration option within a given range for their personal auto-delete, data-storing preference but decided not to. *Id.* 9012:4–19, 9051:6–9054:16. Instead, if users wish to customize their auto-deletion, they must manually delete their search history. *Id.* 9012:4–19, 9013:19–9014:19. Additionally, changing the 18-month default (to either 3 months or 36 months) requires as many as 10 clicks and involves "considerable choice friction." *Infra* ¶¶ 1153, 1158.

567. Google sets the auto-delete default to 18 months despite its own survey showing that 74% of users would prefer that Google store their data for one year or less. *Infra* ¶ 1153.

b) Google Captures Significant Surplus From Its Distribution Deals

568. Google's ability to capture significant surplus from its search distribution deals is evidence of monopoly power in general search services. Tr. 4773:23–4775:13 (Whinston (Pls. Expert)). As Google's chief economist Dr. Varian agreed, large profits are an indicator of monopoly power. Tr. 414:8–10 (Varian (Google)).

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569. In Google's search distribution agreements, the remaining sum after Google pays the net revenue share is Google's profit. Tr. 4773:23–4774:25 (Whinston (Pls. Expert)). Google's profit margin for its ISA with Apple is 64%. JX0033 at -797 (§ 4) (Apple ISA (2016 amend.)). Although this revenue share costs Google billions of dollars, the deal is nevertheless "profitable" for Google because it generates "more billions and billions in revenue." Tr. 7780:16–7781:24 (Pichai (Google)). The magnitude of Google's profit is a sign of Google's large market power. Tr. 4773:23–4775:13 (Whinston (Pls. Expert)); *id.* 4775:15–4777:5 ("[W]hen firms have a really, really big advantage, that is very likely to coincide with market power.").

570. Google has been "very insulated" from competitive responsiveness during its negotiations with Apple. *Id.* 4775:15–4777:5. In a competitive market, Apple would be able to play Google against GSE rivals and capture more of the profits by negotiating a higher revenue share. *Id.* 4773:23–4775:13 ("[I]f [Google] had equally capable rivals, it wouldn't be able to make that amount of money. Apple would play them off against each other. So when you see that level of profit, it's telling you that there's a really big gap and they have a lot of market power."); *id.* 10460:22–10462:23 ("[I]f Google faced rivals that were kind of on par with it, Apple would be able to play them off each other and make almost all the profit in this deal."). As Adrian Perica, Apple's head of corporate development, explained, a more competitive Bing—perhaps bolstered by additional traffic from Apple users—would "create incremental negotiating leverage to keep the take rate high from Google, and further our optionality to replace Google down the line." UPX0240 at -506. Instead, Mr. Pichai admitted that Google "didn't pay the [revenue] share Apple wanted" because Google knew that it was Apple's "only viable option." Tr. 7772:12–7773:10 (Pichai (Google)); Tr. 2464:8–2465:7 (Cue (Apple)) (Apple has no "valid

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alternative" to Google for Safari's default); Tr. 10460:22–10462:23 (Whinston (Pls. Expert)) (Pichai's testimony demonstrates Google's monopoly power); Tr. 9783:21–9787:1 (Murphy (Def. Expert)) (Google had "a lot of headroom" in Apple revenue share negotiations).

c) Google Does Not Invest In Quality Improvements

571. Google's failure to invest in quality improvements is direct evidence of its monopoly power in general search services. Google "does not . . . consider whether users will go to other specific search providers (general or otherwise) if it introduces a change to its Search product." UPX6019 at -365–66 (written 30(b)(6) response).

572. When Google has run quality degradation experiments, it has found user substitution was very limited, meaning that there was little cost to Google and reduced incentives to invest in quality improvements. UPX1082 at -294; Tr. 4770:23–4772:24 (Whinston (Pls. Expert)) (explaining UPX1082 at -294). Google has underinvested in search despite significant overall growth in search queries. Despite seeing a 45% increase in total queries between 2014 and 2017, Google decreased spending on search machines during that period. UPX0752 at -017. This "under-invest[ment]" led to corresponding decreases in search quality, including a smaller index, higher latency, and serving errors. Des. Tr. 192:1–196:19 (Porat (Google) Dep.) (discussing UPX0752 at -017); UPX0752 at -017; UPX0223 at -122 (graph of Google's latency increase); Tr. 7443:9–7445:17, 7450:2–7451:4 (Raghavan (Google)) (rejected a proposed investment in more data centers to reduce latency). Google's crawl has also not kept pace with the size of the web: in 2017, Google's index fell by 40% even as queries on its search engine have increased. UPX0722 at -308; UPX0249 at -547 (depicting Google's query growth and index decline on a chart).

573. Google's "R&D" intensity has not been high relative to other firms. Tr. 5857:5–5858:21. (Whinston (Pls. Expert)) (discussing UPXD104 at 79).

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574. Google's ability to avoid investing in quality improvements at the rate it would in a competitive market is a sign of monopoly power in the general search services market, where there is no monetary price for users. *Id.* 10476:24–10477:12; UPX0891 at -884 ("Because Search is organizationally firewalled from Ads, revenue is not tracked directly. Value is therefore typically expressed in terms of improvements in well-understood metrics" such as rater-based Information Satisfaction, or IS, scores and live experiment metrics.).

B. Google Has Monopoly Power In The U.S. Search Ads Market

1. Google's High And Durable Market Share In Search Ads

575. In 2020, Google's U.S. Search Ads market share was 74%. Tr. 4779:7–15 (Whinston (Pls. Expert)) (explaining UPXD102 at 63). Google's Search Ads market share has been durable. Between 2012 and 2020, Google's share ranged from just below 65% to 74%. Tr. 4779:7–15 (Whinston (Pls. Expert)) (explaining UPXD102 at 63); UPX0006 at -329 (Google's U.S. Search Ads market share grew from 68% to 77% between 2017 and 2020.).

576. Google's market share in Search Ads has remained persistently high during a period of overall growth in the Search Ads market. Tr. 8874:25–8875:13 (Israel (Def. Expert)) (The overall Search Ads market has grown.).

577. Outside the Search Ads market, growth in other digital platforms outside the Search Ads market (e.g., TikTok and Facebook) did not come by shifting ad spend away from Google, but rather by creating new opportunities for advertisers and expanding the overall size of the digital advertising "pie." Tr. 8873:25–8874:21 (Israel (Def. Expert)) (Advertising spend on other digital platforms, like Facebook and TikTok, are "all growing. Google is not shrinking. They're all growing. The other ones are growing faster. So these are share numbers out of a pile that's getting bigger."). Thus, for example, growth in Amazon's advertising business did not come at the expense of Google's advertising business; Tr. 7434:16–7435:20, 7436:2–7438:19,

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7439:8–7440:25 (Raghavan (Google)); UPX0436 at -005 (email from Mr. Dischler (Google): "Amazon is growing in advertising. Based on the best analysis we have, most of this is offline co-op spend coming online, not cannibalizing us."). Mr. Dischler believed Amazon was not "cannibalizing" Google when he wrote a contemporaneous email in 2020, however, at trial he sought to disavow his own written words. Tr. 1496:24–1497:16 (Dischler (Google)).

578. The majority of Google's overall revenue comes from Search Ads. Tr. 1137:2–14 (Dischler (Google)); Des. Tr. 98:3–13 (Miller (Google) Dep.) (explaining UPX0046 at -351; "Search Ads have driven the vast majority of [Google's] profits and have allowed [Google] to make significant investments in other businesses."); Tr. 3668:16–3669:11 (Ramaswamy (Neeva)) ("Google made most of its money early on from search advertising . . . [C]ertainly it was Google's most profitable division by a long shot.").

579. Google's market share understates its power in the Search Ads market because other providers are not options for many customers. Tr. 5124:9–5125:3 (Booth (The Home Depot)) (The Home Depot cannot purchase ads on Amazon because The Home Depot does not sell products on Amazon); Des. Tr. 115:11–22 (Raymond (Kohl's) Dep.) (Kohl's mostly does not purchase ads on Amazon because it does not sell products on Amazon); PSX00267 at -282 (top brands that sell on Google but not Amazon include Walmart, The Home Depot, Macy's, and Williams-Sonoma).

2. Barriers To Entry In Search Ads Are High

580. Showing Search Ads requires a general or specialized search engine. Constructing a search engine requires developing search functionality capable of (1) accepting and interpreting queries, (2) retrieving and ranking results from an index or other source (which, in the case of a GSE, requires crawling and indexing the Web), and (3) organizing and displaying the results to the user. All require significant capital and engineering investments. *Supra* ¶¶ 531–540

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(§ V.A.2.a); Tr. 4781:11–19 (Whinston (Pls. Expert)) (costs applicable to the general search services market also apply to the ads market).

581. In addition to the costs attendant to the search engine itself, providing Search Ads requires a mechanism for advertisers to bid, target, and provide ad copy; mechanisms for matching Search Ads to queries through keywords, product feeds, or other matching techniques; tools advertisers can use to monitor performance and make real-time improvements; engineering resources to develop, maintain, and improve these mechanisms; and sales and marketing personnel. Tr. 5458:23–5459:6, 5462:11–5463:8 (Jerath (Pls. Expert)); Tr. 1199:18–20 (Dischler (Google)) (Google's ad auction is "highly automated" and "reasonably complex.").

582. Google's annual costs for providing Search Ads are approximately $[redacted] billion, separate from the $[redacted] billion associated with providing search services. Tr. 4764:1–4765:6 (Whinston (Pls. Expert)) (referring to redacted figures in UPXD102 at 52).

583. Smaller advertisers prefer larger ad platforms; there are fixed costs associated with purchasing ads on search engines, and those fixed costs are more material for smaller advertisers with fewer ads to offset the costs. Tr. 8861:5–24 (Israel (Def. Expert)) ("fixed costs" of "joining a new ad platform are more material for small advertisers than large").

584. Notably, over the years, Facebook has made multiple unsuccessful attempts to enter the Search Ads market. Des. Tr. 93:2–15 (Levy (Meta) Dep.) (Meta no longer sells "Sponsored Results," a form of Search Ads); *id.* 145:13–146:16, 148:2–14 (reviewing UPX1015 at -725; Facebook Search Ads dropped from success forecast due to poor performance), *id.* 151:6–11, 151:16–25 (reviewing UPX1015 at -751; Meta's Search Ads product was "a really small part of the business"). Indeed, while Facebook projected in 2013 that it would grow its Search Ads revenue to $498 million annually by 2016, UPX0914 at -090, it failed to meet that

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projection and by 2018 its Search Ads revenue remained at $0, UPX1015 at -760. Des Tr. 152:4–13, 153:16–19, 153:22–23 (Levy (Meta) Dep.) (reviewing UPX1015 at -760)..

585. Google recognizes that, due to the nature of Facebook's product, the social network is ill-suited to offer Search Ads. Tr. 1491:21–1492:2 (Dischler (Google)) ("The search feature is just not very important on Facebook for searching for products or services or other commercial things.") (discussing UPX0423 at .001) (Facebook Search Ads "seem like small money due to low intent today.").

3. Advertisers Perceive Limited Alternatives To Google For Search Ads

586. Advertisers do not view shifting spend away from Google Search Ads as a viable option for their businesses. Tr. 5458:23–5459:6, 5464:2–13, 5465:13–22, 5466:7–5467:4 (Jerath (Pls. Expert)) (discussing UPXD103 at 30–32); *supra* ¶ 430–439 (§ IV.B.3) (describing limited alternatives to Search Ads). The advertising industry broadly shares the view that there are limited alternatives to Google Search Ads. For example, Mr. Dijk explained that Booking.com has tried unsuccessfully to reduce its dependence on Google. Tr. 5279:21–5281:4 (Dijk (Booking.com)); 5284:1–5 (Dijk (Booking.com)) (Travel industry is "completely reliant on Google."); Tr. 6515:21–6516:1, 6533:6–20 (Hurst (Expedia)) (Google Search Ads "essential"; not "mathematically possible" for Expedia to grow its business without advertising on Google); Des. Tr. 123:3–22, 125:25–126:9, 126:13–15, 126:17–127:1, 127:3–18 (James (Amazon) Dep.) ([redacted] would have negative consequences for raising consumer awareness of new product families.); Des. Tr. 258:15–259:7, 260:12–261:22 (Dacey (TripAdvisor) Dep.) (TripAdvisor cannot reasonably stop buying ads or reduce ad spending on Google because it would see a "significantly negative impact" to its business if it shifted ad purchases from Google to Bing).

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587. As advertisers are looking for consumers' attention, or "eyeballs," the volume of available queries on a given platform is an important consideration when deciding how to allocate Search Ad spend. Tr. 5463:9–17 (Jerath (Pls. Expert)) ("And in the case of search ads, they're looking for people who are doing searches who [they] can show ads to."); Tr. 3831:9–19 (Lowcock (IPG)) ("[T]he more scale a search engine has the more important it is to buy advertising on that platform.").

588. Google's higher share of queries provide advertisers increased opportunities to appear on a SERP; accordingly, advertisers allocate much more Search Ad spend to Google than to rival GSEs. The Home Depot allocates an "industry standard" 90% of its paid search spend to Google versus about 10% to Bing because "Google has more search volume" and more auctions. Tr. 5141:19–5142:13 (Booth (The Home Depot)); Tr. 4873:13–20, 4874:17–4875:2 (Lim (JPMorgan)) (discussing UPX0441 at -803 and explaining that Google, as a "core partner," received more than 90% of JPMorgan's search spend due to "overwhelming market share"); Tr. 6595:12–6596:2 (Vallez (Skai)) ("[B]ecause Google has the majority of search volume, [advertisers] start and spend most of their time with Google."); Des. Tr. 185:14–22 (Stein (IAC) Dep.) (Angi relies mostly on Google for traffic because it "is by far the largest search engine directing the most traffic"); UPX1131 at -370 (Apple spends [redacted]% of SEM, or $[redacted] million annually, on Google because "Google's dominance allows them to retain 90%+ market share in AMR, EMEA & RPAC."); *id.* at -371 ("Apple Search Marketing/Q&A" explaining that Apple maximizes spend on Bing and Yahoo but cannot "just spend more on Bing, Yahoo, Baidu or just use SEO" because "most people in the world (except [China]) search on Google" and Apple would "lose incremental revenue by not advertising on Google.").

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4. Direct Evidence Of Monopoly Power In The Search Ads Market

589. As set forth in the following section, Google has demonstrated its power to affect Text Ad pricing. Text Ads constitute approximately 64% of the Search Ads market; Google's pricing power in the Text Ads market therefore confers on Google the ability to control price in a significant portion of the Search Ads market, even without regard to any of Google's other Search Ads products. Tr. 4797:2–14 (Whinston (Pls. Expert).

a) Google's Search Ads Business Has Generated Persistently High Profit Margins

590. Google's Search Ads business has generated persistently high profit margins. Tr. 1253:19–22 (Dischler (Google)) ([redacted]% to [redacted]% profit margin for Google's Search Ads over the last five years).

591. In a 2020 exchange about antitrust concerns, Dr. Varian's colleague advised him that "[t]he base of most concerns with Google is that you have strong prima-facie market power in search, that you make a very large amount of profit, and that these are linked. You can argue that you don't have market power in search, but it's going to be extremely difficult to win that argument until you stop making large amounts of money." UPX0452 at .003–04. Dr. Varian responded: "I agree with the point that defending Google's profits is difficult, but I'm going to try anyway." *Id.* at .004.

592. Internally, Google tracks its profitability in detailed profit-and-loss statements (P&Ls) and circulates this information to executives. Tr. 7516:19–7518:25 (Raghavan (Google)) (P&L reports, such as UPX0453, are prepared quarterly by the finance teams and transmitted to Raghavan and others.); Tr. 1254:17–25, 1258:10–1259:13 (Dischler (Google)) (P&L reports, such as UPX2001 and UPX0489, are regularly distributed.).

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593. Google's P&Ls include a segment called "Search+," which tracks the profitability of Google's search and Search Ads activities. Search+ measures the revenues that Google earns from the sale of Search Ads relative to the costs Google incurs in operating both its search engine and its Search Ads business. Tr. 7520:13–25 (Raghavan (Google)) (Search+ includes the costs associated with providing organic search results and the costs and revenues associated with Search Ads.); Des. Tr. 96:15–21 (Porat (Google) Dep.) (Search+ is the sum of the costs and revenues for the Search and Search Ads product areas.). Search+ includes a small amount of revenue from other products, but more than [redacted]% of the revenue is from Search Ads. Tr. 1263:13–1264:4 (Dischler (Google)).

594. Google's Search+ revenues have grown rapidly. Between 2014 and 2021, Search+ revenues grew from $46.8 billion to $146.4 billion. UPX7002.A (compiling information from P&Ls at UPX0490, UPX0491, UPX0492, and UPX0493); Tr. 7548:15–7549:9 (Raghavan (Google)) (reviewing UPX0342 at -824 and agreeing that revenue growth consistently met the 20% goal between 2010 and 2018; revenue growth from $17 billion in 2010 to $83 billion in 2018 represented an overall growth rate of 400% over nine years; for more than ten years Search Ads accounted for approximately two-thirds of Google's overall revenue and growth); UPX0342 at -824; UPX0012 at .002 ("First off we wanted to remind you that we are all part of a most amazing business. Search Ads + O&O has grown at an incredible rate over the past decade – typically in the high teens – reaching $98B [in 2019], and despite covid – we'll exceed $100B [in 2020].").

595. Between 2014 and 2021, Google's Search+ profit margins remained steadily high—during each year in this period, Google's gross margin exceeded [redacted]%, and its operating margin exceeded [redacted]%. UPX7002.A. Given Google's ability to sustain high margins while

[redacted]

rapidly growing revenue, its bottom-line profits for Search+ more than [redacted] billion in 2014 to nearly $[redacted] billion in 2021. *Id*.

596. The single largest expense that Google incurs in its sale of Search Ads is TAC. Tr. 7576:9–7577:2 (Raghavan (Google)). Between 2014 and 2021, Google's Search+ TAC payments grew from $7.1 billion to $26.3 billion. UPX7002.A. Google spends more on TAC than on all other Search+ costs combined. Tr. 7577:3–6 (Raghavan (Google)).

597. Each year, Google spends multiples more on TAC than it spends on R&D. For example, although Google spent $26.3 billion on Search+ TAC in 2021, it spent only $[redacted] billion on Search R&D. *Compare* UPX7002.A *with* DXD-21 at .002; Tr. 7577:7–24 (Raghavan (Google)) ("I would say there's a large ratio between the traffic acquisition and the [R&D] numbers I see here.").

598. For 2021, Google forecasted a Search Ads gross margin of [redacted]% and a Search Ads operating profit of $[redacted] billion for an operating margin of [redacted]%. UPX2001 at -547. In 2021, Google's total ads gross margin was [redacted]%, and its total ads operating profit was $[redacted] billion for a total ads operating margin of [redacted]%. UPX0489 at .002; UPX7002.A (demonstrating Search+ operating profit margins of between [redacted]% and [redacted]% from 2014 to 2021). For 2022, Google forecasted a Search+ gross margin of [redacted]% and a Search+ operating profit of $[redacted] billion for an operating margin of [redacted]%. UPX0489 at .002. For the same period, Google forecasted $[redacted] billion in Search+ revenue which represented over [redacted]% of Google's total forecasted advertising revenue. UPX0489 at .002.

599. Google's Search Ads are far more profitable than Google's other types of advertisements. For display ads (sometimes referred to as "DVA" or "DVAA") in 2022, Google forecasted revenue of $[redacted] billion and an operating margin of [redacted]%, both of which are

[redacted]

significantly lower than Search+'s [redacted]% operating margin and $[redacted] billion in revenue. UPX0489 at .002; Des. Tr. 105:4–20 (Miller (Google) Dep.) (Search Ads are more profitable than display ads because display ads involve revenue-sharing with publishers' websites).

600. For YouTube in 2022, Google forecasted revenue of $[redacted] billion and an operating margin of [redacted]%, both of which are significantly lower than Search+'s [redacted]% operating margin and $[redacted] billion in revenue. UPX0489 at .002.

601. Others in the industry recognize the outsized profitability of Search Ads. Dr. Ramaswamy, former Google executive and Neeva founder, referred to search as "one of the most profitable businesses ever." Tr. 3796:5–3798:22 (Ramaswamy (Neeva)). Mr. Perica, Apple's VP of Corporate Development, has said "there aren't so many businesses on the planet that have such high marginal profit[] on incremental revenues." UPX0635 at -352. Mr. Nadella explained that search is "the largest software category out there by far" in terms of "share, revenue, margins. Whichever way you look at it, . . . it's dominated by one player, so therefore it's got high margins." Tr. 3488:3–3489:2 (Nadella (Microsoft)).

C. Google Has Monopoly Power In The U.S. Text Ads Market

1. Google Has High And Durable Market Share In The Text Ads Market

602. In 2020, Google's Text Ads market share was 88%. Tr. 4777:21–4778:15 (Whinston (Pls. Expert)) (explaining UPXD102 at 62).

603. Google's Text Ads market share has been durable; between 2016 and 2020, Google's share continually exceeded 80%. Tr. 4777:21–4778:15 (Whinston (Pls. Expert)) (explaining UPXD102 at 62).

604. The majority of Google's revenue comes from Search Ads, *supra* ¶ 578, and the vast majority of Search Ads revenue comes from the sale of Text Ads. Tr. 1180:25–1181:6, 1181:11–13 (Dischler (Google)) (80% of Search Ads sold by Google were Text Ads); *id.*

[redacted]

1476:25–1477:5 (majority of Google's revenue comes from Text Ads); Tr. 4133:3–9 (Juda (Google)) (Text Ads "large majority" of Google Search Ad revenue) (referencing redacted figures in UPX0467 at -331).

2. Text Ads On Google Are A "Must Have" For All Companies Because They Cannot Reach The Same Scale Of Queries Elsewhere

605. As with Search Ads, Text Ads are critical to many advertisers' businesses; when purchasing Text Ads, however, advertisers have few alternatives to Google. The reasons provided for Search Ads, *supra* ¶¶ 586–588 (§ V.B.3), apply equally to Text Ads.

606. Because rival search engines' query volume is much smaller than Google's, many advertisers cannot shift their Text Ad spend away from Google without significantly reducing the number of impressions and clicks their ads receive; accordingly, shifting is not an option. Tr. 3834:8–3834:11, 3834:22–3835:1 (Lowcock (IPG)) ("The primary purpose of advertising is to reach audiences and to reach people at scale . . . and "scale" means large audience sizes. And so the more scale a search engine has the more important it is to buy advertising on that platform. . . [B]ased on market share, there's a limit to the amount of keywords we could buy on Bing") (discussing UPX0450 at .016); UPX0450 at .016 (showing search engine U.S. market shares for Google and Bing at nearly 90% and below 10%, respectively); Tr. 4875:18–4876:4 (Lim (JPMorgan)) ("Our spend with Bing maxes out where their volume ends regarding the keyword search volume against the terms that we care about as a firm. So once we max out there, which is roughly 10 percent of our paid search budget, there's no where else to go."); Tr. 6564:22–6565:19 (Hurst (Expedia)) (If Expedia stopped advertising on Google, "[t]he only real comparable for the text ads would be Bing, and [Expedia] wouldn't be able to redeploy all that money in a similar intent environment."); Tr. 5281:21–5282:12, 5284:6–8 (Dijk (Booking.com))

[redacted]

(Booking.com "would gladly spend more far more" on Text Ads on Bing, but is "constrained because the demand is clearly not there.").

607. This lack of available alternatives prevents advertisers from shifting away from Google even in response to dissatisfaction with Google's quality. Tr. 4869:1–4870:11 (Lim (JPMorgan)) (JPMorgan did not shift spend away from Google in response to degrading quality of Google reporting because "Google represents the vast majority of the keyword search interest, the volume in the marketplace. . . Bing doesn't have an equivalent volume so we would be unable to move budgets between those two partners"); Tr. 5222:20–5223:9 (Booth (The Home Depot)) (The Home Depot did not shift spend away from Google when Google reduced information provided in performance reports.); Tr. 5495:8–16 (Jerath (Pls. Expert)) (Advertisers continue to spend money on Google because "the search traffic is there, they need to tap into it, so Google it is"); Infra ¶¶ 609–626 (§ V.C.4); 1169–1192 (§ VIII.D.2) (describing ad quality reductions).

3. Barriers To Entry In Text Ads Are High

608. Barriers to entry in the Text Ads market are the same as those in the Search Ads market, which are described above. *Supra* ¶¶ 580–584 (§ V.B.2).

4. Google Has Steadily Made Changes Increasing CPC And Lowering Quality

a) Google Has Increased Participants In Auctions And Increased CPCs

609. As discussed previously, *supra* ¶¶ 461–465, Google targets its Text Ads by matching advertiser-selected keywords to queries. Advertisers also select "match types," which dictate how closely the keyword needs to match the users' query; using match types, the advertiser can expand or narrow the queries for which an ad can appear. *Supra* ¶¶ 464–465.

610. Over time, Google has limited advertiser control over the specificity of matching, thereby limiting advertisers' ability to control which auctions they enter and the SERPs on which

[redacted]

their ads appear. Tr. 5479:4–5480:17 (Jerath (Pls. Expert)) (providing examples of Google's expansions to Exact Match and Phrase Match); DX0161 at -542–43 ("Semantic Exact" launch "follows the same spirit as other coverage-increasing" keyword launches.). This affects not just the advertisers unwillingly pulled into auctions they prefer to avoid, but also the other participants in those auctions who see increased auction pressure and, therefore, higher CPCs. UPX1117 at -107 ("[I]ncreased auction pressure" leads to "dramatic" CPC increase under semantic matching.).

611. Advertisers have opposed these changes. UPX0050 at -070 ("Last year, we received criticism in response to Semantic Exact changes. We expect the rollout will result in similar negative sentiment since advertisers and agencies do not see the benefit of this change."); UPX0921 at -067 ("Although the small changes that Google makes to these types of settings every so often may not seem so significant, they are slowly taking away advertiser's responsibilities and control. Google's heavy push on automation through machine learning gives Google the upper hand and ultimate control on what is being displayed on Google Ads."). Google's ability to enact these changes, against the will of and to the detriment of advertisers, is evidence of its monopoly power.

612. Google has also eliminated advertisers' ability to opt-out of those keyword expansions. Tr. 1478:12–14 (Dischler (Google)).

613. For example, Google's most granular match type is "Exact Match." UPX8023 at .002. *Supra* ¶ 465. Exact Match once operated as its name suggests—for ads to trigger, queries needed to contain keywords exactly matching one selected by the advertiser. UPX8055 at .001–02 (April 17, 2012 Google blog post describing initial operation of Exact Match). Google's next most granular match type is "Phrase Match." UPX8023 at .002. Similarly, to trigger ads, Phrase

[redacted]

Match once required the keyword phrase to be the same as the phrase's use in the query. UPX8055 at .001–02.

614. In approximately April 2012, Google changed Exact Match and Phrase Match to include "close variants" of the keywords, i.e. misspellings, singular/plural forms, stemmings, accents and abbreviations." UPX8055 at .002; UPX8100 (Google Ads Help post describing "[n]ew matching behavior for phrase and exact match keywords").

615. Google initially permitted advertisers to opt campaigns out of the expansions, and advertisers opted out approximately 30% of Exact and Phrase Match revenue. UPX0518 at -573 (within 10 months of expansion, approximately 25% of Exact and Phrase Match revenue had opted out, including top advertisers); Tr. 5478:2–5479:2 (Jerath (Pls. Expert) (ultimately 30% of revenue opted out). Google recognized the value to advertisers of being permitted to opt-out: "If advertisers prefer to have control, . . . they'll decide to opt-out and they'll appreciate the option." UPX0782 at -786 (Nick Fox Mar. 2012 email).

616. However, Google removed the opt-out option in 2014, forcing all match types to accept the expansion to all campaigns. Tr. 1478:12–14 (Dischler (Google)); UPX8049 at .003 (Aug. 14, 2014 Google Blog Post: "For advertisers that opted out, the option to disable close variants will be removed in September [2014]"); Tr. 5478:2–19, 5482:10–17 (Jerath (Pls. Expert)). Google continued to expand its match types, making additional changes in 2017, 2018, and 2019—all, again, without opt-out options. UPX0031 at -471 (showing evolving expansion of keyword match types); UPX8050 at .001–002 (2017 expansion of Close Variants); UPX8040 (2018 expansion of Exact Match to include semantic matches); UPX8099 (2019 expansion of Broad and Phrase Match).

[redacted]

617. Google's Exact and Phrase Match types have now expanded beyond close variants to include "semantic matching," which matches keywords to queries containing "analogous words" selected by Google. Tr. 1362:19–1363:16 (Dischler (Google)) (describing implementation of semantic matching in 2018 and 2019).

618. Google has not offered text advertisers a simple, binary "opt out" option from these expanding match types. Tr. 8882:17–21, Tr. 8886:6–21 (Israel (Def. Expert)) ("[Y]ou can opt out of certain keywords but semantic matching is the Google system."). Google proposes instead that advertisers identify and specify "negative keywords," which prevent an ad from matching queries containing the negative keyword. Tr. 4298:4–4299:1 (Juda (Google)); Tr. 8882:22–25, 8883:9–15 (Israel (Def. Expert)) ("[I]f there are certain version[s] that would semantically match and they don't want to be there, they could put in negative keywords."); UPX8024 at .001 (defining negative keywords).

619. Google, however, provides no close variant or other expansive option for negative keywords, obligating advertisers to first identify as a separate negative keyword each semantic match they might trigger, Tr. 8886:22–8887:13 (Israel (Def. Expert)), and, for each such term, "add synonyms, singular or plural versions, misspellings, and other close variations if [the advertisers] want to exclude them." UPX8024 at .001–02; UPX0049 at -611 ("[Google's process] forces advertisers to go through the tedium of continuously adding more and more negatives that are very similar to the ones that they already have."); UPX0516 at -580–81 (Google summarizing advertiser feedback; "As keywords get more automated, advertisers want more control via usage of negative keywords. . . . Advertisers want . . . the option to choose if they want to expand the negative keyword to misspellings."). For advertisers with large keyword

[redacted]

lists, this can be a tremendous undertaking, if even possible. Tr. 1370:8–11 (Dischler (Google)) ("[W]e have some advertisers who have more than a billion keywords in the system.").

620. Negative keywords are therefore an inefficient and cumbersome way to opt out of unwanted match-type expansions, particularly when compared to Google's now-withdrawn opt-out option. Tr. 5480:18–5481:22, 5513:18–5514:2, 5514:7–5515:18 (Jerath (Pls. Expert)) (Advertisers' experiences with negative keywords are "inefficient and really cumbersome."); Tr. 8885:11–8886:2 (Israel (Def. Expert)) (Reviewing UPX0049 at -611 and agreeing that using negative keywords "requires work if there are certain terms that you don't want;" "this is a challenge of an auction process"). Smaller advertisers face a particularly acute burden. Tr. 5513:18–5515:18 (Jerath (Pls. Expert)) ("[T]he larger advertisers, they may have access to automated resources to generate these things, but the smaller ones won't."); Tr. 8886:22–8887:13 (Israel (Def. Expert)).

621. Moreover, Google has reduced the granularity of information it provides advertisers concerning the queries matching their ads, which exacerbates the already-difficult task of identifying negative keywords. *Infra* ¶¶ 1172, 1184, 1186.

622. Thicker auctions, i.e. auctions with more participants, generally lead to higher CPCs. Tr. 1478:8–11 (Dischler (Google)); Tr. 3830:23–3831:8 (Lowcock (IPG)) (Increasing the number of bidders in an auction "should increase the price."); Tr. 8860:5–16 (Israel (Def. Expert)) ("[I]t is probably true on average" that more advertisers in an auction tends to lead to a higher price.); Tr. 5481:23–5482:8, (Jerath (Pls. Expert)) (Thicker auctions "on average" results in "higher prices.").

623. By expanding match types while removing the ability for advertisers to opt out of the expansions, Google has included advertisers in actions they would have otherwise chosen to

[redacted]

avoid, thickening auctions and increasing CPCs. Tr. 5481:23–5482:08, (Jerath (Pls. Expert)) ("THE COURT: And is the concern that by virtue of withdrawing this option, that advertisers will be put into auctions that they otherwise might not want to be a part of and, therefore, creating thicker auctions and the result being a potentially greater price. THE WITNESS: Absolutely . . . this makes it easier for advertisers to enter auctions, but much more difficult for them to not enter these auctions. So on average, that would lead to thicker auctions, exactly as you said, and thicker auctions means more — higher prices"); Tr. 1477:25–1478:7, (Dischler (Google)).

624. Google acknowledges its keyword expansions increased CPCs. Google determined that its October 2018 Semantic Exact Match expansions increased revenue and that the "Impact on Revenue is due to increased auction pressure, therefore higher CPC: Competitors are now bidding on keywords they weren't historically competing on so it may cost more to serve on those terms." UPX0961 at -476; DX0161 at -542 ("This coverage increase also leads to denser auctions and higher CPCs."). Google also found that the 2018 expansions pulled advertisers into auctions where they paid 20–30% more than on their pre-expansion Exact Match traffic. *Id.* at -560 ("New clicks and conversions are, on average, only between 20% and 30% more expensive than existing exact traffic."); UPX0050 at -072 (for 2019 expansion, advertisers "currently using exact match may see an increase in cost because they are targeting more searches than they were previously.").

b) Reduced Advertiser Control Over Where Search Ads Appear

625. Google has also reduced advertiser control over where their Search Ads appear. For example, advertisers purchasing shopping ads cannot choose to purchase ads only on the google.com SERP, but must also permit Google, in Google's discretion, to place their ads on other Google surfaces, i.e., Google's shopping immersive or images page. UPX8026 at .003

[redacted]

(Google Ads Help explaining that shopping ads can appear on Google Search, Google Images, and Google's shopping tab); Des. Tr. 32:22–34:22, 48:17–50:13 (James (Amazon) Dep.) (discussing UPX0061 at -437); UPX0061 at -437 ("We [Amazon] want control for where we do and where we do not show our ads. Aligned with Google putting our Shopping Ads on Google Images, and the lack of data, we don't have the option to be there, or to change our bids for the placement.").

626. Further, Google does not tell advertisers on which surface(s) Google has chosen to show their ad. Des. Tr. 26:10–18, 36:18–38:9, 160:25–161:14, 161:16–162:9 (James (Amazon) Dep.) (discussing UPX0511 at -619). This impacts the advertiser's ability to optimize its spend—by, for example, bidding differently for ads on different surfaces. Des. Tr. 32:22–34:22, 35:9–23, 36:10–17, 48:17–50:13 (James (Amazon) Dep.). ("When Google chooses to take one of our ads and put in on any number of different surfaces, we lack the ability to optimize for that placement."). Google's conduct also requires the advertiser to appear on Google properties the advertiser may prefer to avoid for competitive reasons. Des. Tr. 139:4–140:7 (James (Amazon) Dep.) (Google's placement of Amazon ads on Google's shopping immersive "means that Amazon's brand, as well as products that Amazon makes for sale, are now being leveraged in order to help, you know, another store, effectively, develop and grow their catalog of products.").

5. Direct Evidence Of Google's Monopoly Power In The Search Ads And Text Ads Markets

627. Google can, and has, profitably raised advertiser's prices in the Text Ads market. *Infra* ¶¶ 629–637 (§ V.C.5.a). This also raises prices in the overall Search Ads markets. *Supra* ¶ 589 (describing effect on Search Ads markets).

[redacted]

628. This pricing power is one reason Google's "core business (Search) is incredibly lucrative with unlimited TAM [Total Addressable Market], providing endless capital to allow [it] to hire the best talent and take big risks." UPX0275 at -078 ("Resources: our). As one Google employee wrote: Search advertising is one of the world's greatest business models ever created . . . there are certainly illicit businesses (cigarettes or drugs) that could rival these economics, but we are fortunate to have an amazing business. . . . [W]e've essentially been able to ignore one of the fundamental laws of economics – businesses need to worry about supply and demand. . . . When talking about revenue, we could mostly ignore the demand side of the equation (users and queries), and only focus on supply side of advertisers, ad formats, and sales. . . . [W]e could essentially tear the economics textbook in half. UPX0038 at -619; Tr. 1694:15–1697:22 (Roszak (Google)) (discussing UPX0038).

a) Google Has Profitably Raised Prices In The Text Ad Market Without Losing Share To Rivals

629. A firm's ability to profitably raise prices in a relevant market without losing share to rivals is direct evidence of market power. Tr. 4796:12–4797:14, 10473:14–10474:2 (Whinston (Pls. Expert)). Google does this. Tr. 3825:12–24 (Lowcock (IPG)) ("[I]f the price of Google's text ads increased by 5 percent, would you recommend to your clients to move their ad spend elsewhere? A. No."); *id.* 3825:25–3826:10 (IPG clients have not moved spend away from Google despite increases in Google's Text Ad CPCs).

630. A monopolist selling through an auction it controls possesses multiple levers to influence auction prices. Tr. 465:9–12 (Varian (Google)). Thus, a monopolist auctioneer can exercise its monopoly power to increase prices, including by changing the auction's design, changing the algorithm than runs the auction, or increasing the auction's reserve price. *Id.* 464:1–465:8.

[redacted]

631. In its Text Ad auctions, Google applies those levers through what it calls "'intentional' pricing," where Google "directly affect[s] pricing through tunings of [its] auction mechanisms, in general through the three levers that are format pricing, squashing, or reserves." UPX0509 at -869; Tr. 4102:18–4103:2 (Juda (Google)) (Google can directly change how the auction works which impacts pricing).

632. Google has, at times, increased the average advertisers' CPCs by 5%, Tr. 1208:11–24 (Dischler (Google)), and possibly as much as 10% for some queries. *Id.* 1209:2–4; Tr. 8854:3–10 (Israel (Def. Expert)) (not disputing Mr. Dischler's testimony that Google may raise CPCs 10% on some queries). Although Google's 5% increase resulted in fewer ads being sold, Tr. 1210:11–24 (Dischler (Google)), it was nevertheless profitable for Google, *id*. 1209:5–8.

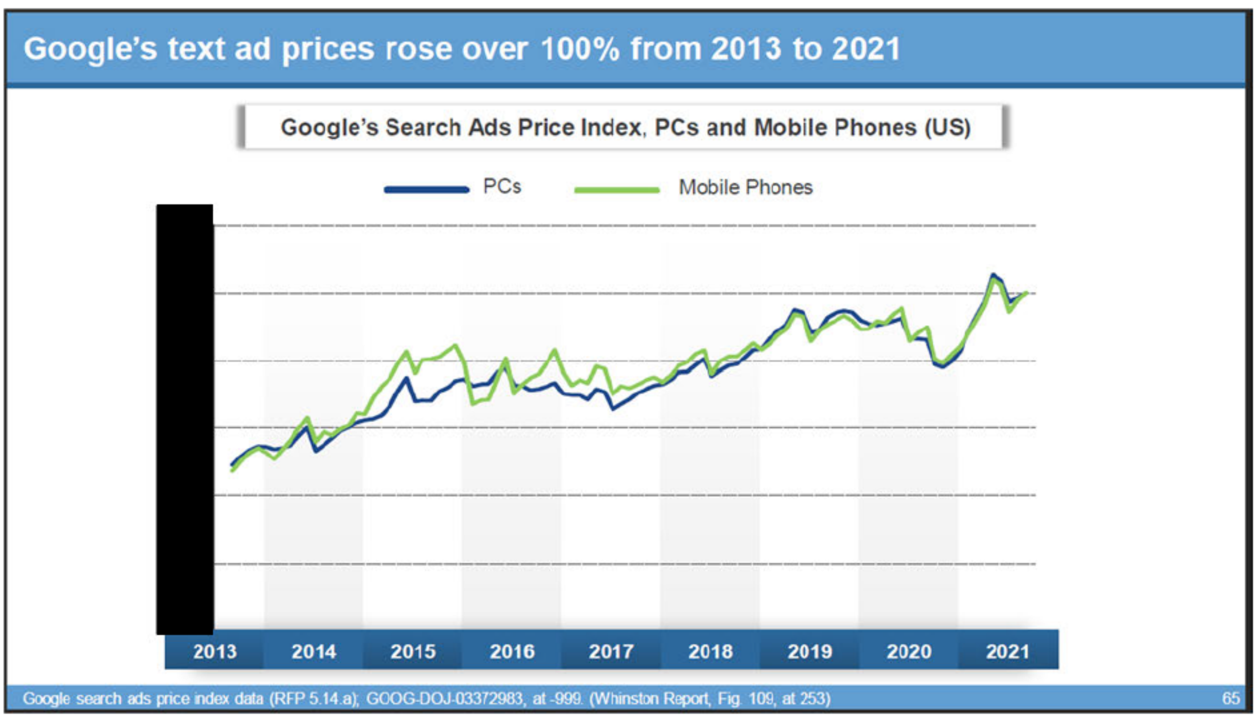
633. Google admitted increasing CPCs by changing its auction mechanism. Dr. Juda, Google Vice President of Ads, testified that he "would describe it less as raising prices and more coming up with better prices or more fair prices, where those new prices are higher than the previous ones." Tr. 4110:1–12 (Juda (Google)). *Id.* 4108:13–15 ("There certainly have been launches where the net aggregate outcome of the launch is that CPCs were higher after the fact rather than before the fact."); *id.* 4300:6–25 (Juda describing his participation in launches that increased average CPC); *id.* 4153:6–10 (discussing UPX0465 at -454) (Juda responsible for 9% annual average "revenue innovation" for each of preceding five years); *id*. 4157:6–13 (discussing UPX0465 at -454) ("[S]everal billion dollars per year of additional revenue has been generated by pairing Ads UI launches with pricing adjustments (where to my team's credit the pricing mechanisms have improved since the original launch)"); Tr. 8855:11–20 (Israel (Def. Ex. (Google)) ("I think it's fair that on average, they've [CPCs] gone up").

[redacted]

634. A firm raising prices to share in (or "extract") the entire value of its quality improvements is a hallmark of market power. Tr. 10474:6–10475:11 (Whinston (Pls. Expert)). A firm in a competitive market needs to innovate or risk losing business to rivals, providing incentives to innovate. In contrast, for a monopolist to have the ability to innovate, it needs to share in the value created by the innovation. *Id.* 10477:15–10479:23.

635. Google's own price indexes show its steady price increases. In 2018, Google created a backwards-looking Search Ads Price Index "that accounts for the changing query stream and accurately represents the movement of Search Ads CPCs over time." UPX0725 at -968. Prof. Whinston's analysis of Google's Search Ads Price Index data shows Text Ads CPCs increased over 100% from 2013 to 2021. Tr. 4782:22–4784:24 (Whinston (Pls. Expert)) (describing UPXD102 at 65).

Figure 8: Prices of Google's Text Ads (2013–2021)



UPXD102 at 65.

[redacted]

636. When a monopolist can engage in price discrimination instead of setting a single price for a market, a monopolist need not limit output to exercise market power. Tr.10453:11–10455:21 (Whinston (Pls. Expert)) ("[I]f you can price discriminate, you can charge different prices to each of the consumers and capture all of that profit, all the surplus from consumers in the limit, if you can price discriminate very well and not even reduce output at all.").

637. Even absent the ability to price discriminate, in a market where demand is not very responsive, a monopolist need not limit output much or at all to exercise monopoly power and raise prices. Tr. 10453:11–10454:25 (Whinston (Pls. Expert)).

b) Google's Auction Incorporates Price Modifiers Controlled By Google

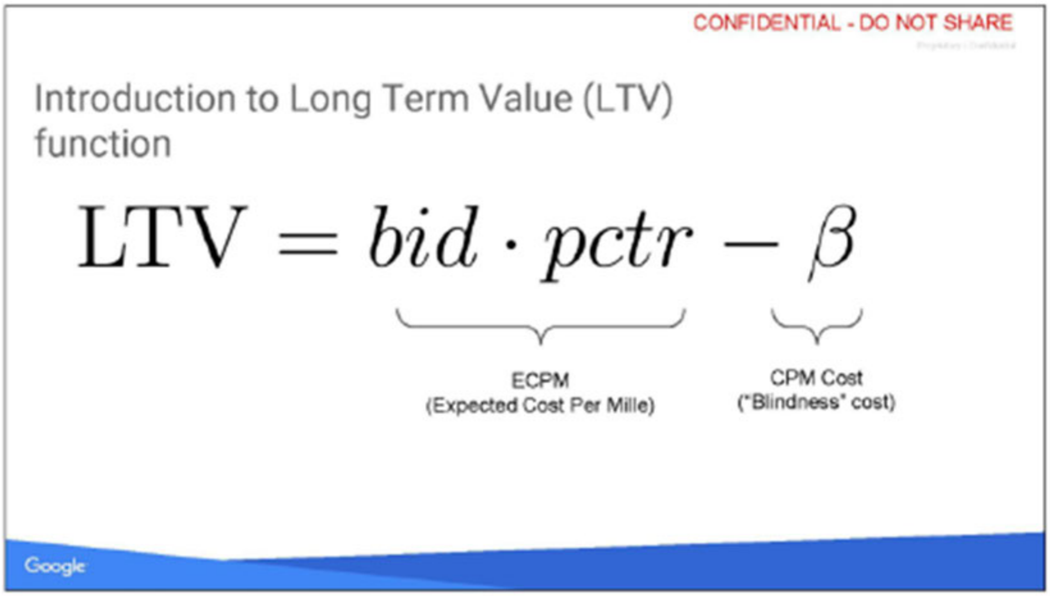
638. Google prices Search Ads through a complex ad auction process that ranks and prices ads using an "LTV" formula, which is Google's estimate of the long-term value of showing the ad in response to a user query. Tr. 4027:16–4028:5, 4033:4–6 (Juda (Google)). Externally, Google refers to LTV as "Ad Rank." *Id*. 4030:16–18. Google calculates LTV for every ad that enters a Search Ads auction. *Id*. 4027:16–4028:5; Tr. 5484:14–5485:1 (Jerath (Pls. Expert)).

639. Google uses LTV as the central ranking variable in its auctions and, if an ad appears and is clicked, Google charges a CPC derived in part from the runner up's LTV. Tr. 4262:5–18 (Juda (Google)); *id*. 4017:5–4018:5 (discussing UPX0842 at . 001). If there is no runner up, Google assumes the runner-up's LTV was zero. *Id*. 4042:12–16.

640. In the LTV calculation, the advertisers' bid, multiplied by the predicted click-through rate, is Google's expected revenue, from which it subtracts its expected cost (i.e., Beta/Blindness) to arrive at anticipated LTV. Google incorporates these components into the following formula:

[redacted]

Figure 9: Google's Long Term Value (LTV) Function



UPX0008 at -054; Tr. 4037:2–9 (Juda (Google)).

641. To calculate the LTV of a particular ad, Google's algorithms produce three predictions, which Google describes as the "quality" components of LTV. Tr. 4248:12–4249:4 (Juda (Google)); UPX0010 at -055:

> (a) Its predicted click-through rate, or "pCTR," which predicts what percentage of viewers will click on the ad if shown in the auctioned position. pCTR has a value between 0 and 1 (i.e., 0–100%). Tr. 4038:8–4039:11 (Juda (Google)) (discussing UPX0008 at -054); UPX0010 at -055.
>
> (b) The ad's predicted landing page quality, or "pLQ," which is meant to capture the value of the landing page to which the ad links. pLQ captures "click cost," which is the effect of clicking on the ad on the user's willingness to click on ads in the future. Tr. 4096:14–23 (Juda (Google)) (discussing UPX0010 at -055–56) (agreeing pCQ and pLQ variables embedded in LTV equation); Tr. 4014:25–4015:4 (Juda (Google)) (defining pCQ and pLQ); UPX0010 at -055 (defining "click cost" and "impression cost.").
>
> (c) Its "predicted creative quality, or "pCQ," which is Google's prediction of the quality of the ad's copy regardless of the landing page. pCQ captures "impression cost" which is how the ad will affect the users' willingness to click on ads in the future. Tr. 4096:14–23 (Juda (Google)) (discussing UPX0010 at -055–56) (agreeing pCQ and pLQ variables embedded in LTV equation); Tr. 4014:25–

[redacted]

4015:4 (Juda (Google)) (defining pCQ and pLQ); UPX0010 at -055 (defining "click cost" and "impression cost.").

642. In the actual LTV formula, Google combines the pLQ and pCQ components into a single variable, called "β," or "beta." UPX0008 at -059. Beta (or "blindness") predicts the impact of the ad on the viewer's likelihood of searching and clicking on Google ads in the future. Tr. 4039:20–4040:6 (Juda (Google)); UPX0037 at -200 (illustrating blindness). All else equal, Google higher quality ads get lower beta scores. Tr. 4040:14–24 (Juda (Google)). In contrast, Google associates higher pCTRs with higher quality ads. UPX0010 at -059 (the more users that click on an ad, the more Google learns the "high-quality nature" of the ad).

643. The ad's bid and pCTR are directly correlated to LTV: an increase in either the bid or pCTR increases LTV. UPX0010 at -055–56. Thus, advertisers with lower bids but higher pCTRs should be able to win auctions with a lower bid and pay a lower price for their slot, absent some modification to the pCTR metric. Tr. 9205:14–9206:25 (Holden (Google)) ("[P]artners that enjoy that higher click-through rate have higher predicted click-through rates in the future and they can bid less to show up in the same location."). Similarly, if an ad's actual click-through rate improves over time, its pCTR will improve, and its CPCs may decline—a phenomena that, as Google recognizes, benefits both advertisers and users. *Id*. 9205:14–9206:25 (Designing an auction that rewards higher pCTR benefits consumers and improves ads by allowing advertisers "to bid less because users find those ads valuable.").

644. In contrast, beta is inversely proportional to LTV: if an ad is very low quality, Google assigns it a high beta score, lowering LTV. Tr. 4040:14–4041:3 (Juda (Google)). If an ad is high quality, Google assigns it a low beta score, increasing LTV. *Id.*

645. A higher LTV increases the chances that an ad will appear. Tr. 4239:6–17 (Juda (Google)) ("[W]hen an ad's LTV score increases, either an ad usually stays in the same position

[redacted]

that it had been but will be able to pay a lower cost, all else equal, or the ad rank may increase by sufficiently large amounts that the ad may move higher on the page and, thus, get a higher ad position.”). Ads with high pCTR, pLQ, and pCQ quality metrics can win an ad auction with a lower bid price. UPX0010 at -056 (“Ads with low quality metrics (*i.e.*, low pCTR, pCQ, and/or pLQ) would need higher bids to successfully compete against ads with higher quality metrics. And *vice versa*, high-quality ads can have lower bids and still compete successfully in auctions.”). In fact, a “key element of the LTV algorithm is the inverse relationship between the advertiser’s bid and the increased quality needed to yield a similar ranking if the bid were lowered.” UPX0010 at -056.

646. Google’s ability to choose how to calculate the “quality metrics” and how much weight it assigns to them gives Google the ability to change the ranking and prices generated by the auction. Tr. 4102:18–4103:2 (Juda (Google)) (agreeing that Google “can directly change how the auction works which impacts pricing” and explaining that placing a greater emphasis on quality could change the prices for some ads, which “could cause the overall average prices to go up or down”); Tr. 4113:16–18 Juda (Google)) (agreeing that “the LTV formula can be tuned”).

c) Google Adjusts Its Auction To Extract Advertiser Value And Increase Bid Prices

647. Google sells Text Ads and other Search Ads through a second price auction so that advertisers will not reduce bids to optimize their spend. Tr. 4263:12–4264:11 (Juda (Google)) (Second pricing obviates “need for [advertisers] to worry about small changes in bids to somehow get a better outcome.”).

648. Google inserted “pricing mechanisms with pricing knobs” into its auction to “extract value more directly.” UPX0889 at -783; Tr. 4121:17–4124:22 (Juda (Google)) (discussing UPX0889 at -779, -783).

[redacted]

649. Google expresses particular concern about "runaway winners," which are auction winners whose LTVs exceed the runner-up's by a large margin (i.e., 20% or more). UPX0506 at .004 ("Our Belief, or the Pricing Problem. Auction often fails to set price near value, especially in Top-1 (runaway winners)."); Tr. 1221:20–24 (Dischler (Google)) (Google implemented squashing technique in part "to try to prevent runaway winners."). Runaway winners often appear first on the page and are likely to pay less than their bid due to their relatively high LTV.

650. Google believes a "good CPC is one that is close to (but lower than) the value an advertiser derives from the click," and therefore seeks to narrow the delta, or "headroom," between an advertisers' bid and their CPC. UPX0506 at .004. Google creates pricing knobs through "mechanism development," described as "improv[ing] the auction score and algorithm . . . by adding new parameters or methods to determine allocation/ranking/pricing. UPX0042 at -106. Mechanism development generates "several billions of dollars in incremental revenue annually." UPX0042 at -106.

651. Google can use those knobs for "tuning," which Google defines as adjusting the auction to increase Google's long-term revenue. UPX0042 at -106; Tr. 1207:4–19 (Dischler (Google)) (Pricing knobs are "an informal way of talking about a parameter tuning within the ad auction function" that allows Google to impact Search Ad pricing); UPX0043 at -582 ("What are we tuning again? Prices! . . . Tuning is just adjusting ranking / pricing.").

d) Google's Uses Pricing Knobs To Increase Prices

652. As discussed above, Google's auction modifies an advertisers' bid using three quality variables: pCTR, pLQ, and pCQ. Tr. 4144:3–6 (Juda (Google)). *Supra* ¶ 641.

653. In recent years, Google relied largely on three pricing knobs to adjust prices: format pricing, squashing, and rGSP. UPX0509 at -869 (Google affects pricing through format pricing and squashing); UPX0059 at -620 (rGSP a better knob than format pricing). These knobs

[redacted]

insert variables into the auction that can be tuned to affect price. *Id.* These knobs are not the only means by which Google has tuned its auction to inflate prices. UPX0505 at -308 (as of 2016, "the components of beta are routinely tuned, often independently, in order to improve aggregate Rasta metrics and extract surplus from advertisers.")

i. Google Used Format Pricing To Increase Prices And Revenue

654. Advertisers can annotate Text Ads with optional pieces of information known as "formats," or "extensions." Tr. 4254:3–5, 4254:19–4255:1 (Juda (Google)). In 2012, Google modified its auction to insert a knob permitting it to increase CPCs for ads with formats. UPX0505 at -307–08 ("We launched LIPI in August 2012, an interim solution that charged a constant cost for each format based on height."); Tr. 1273:10–12 (Dischler (Google)) (Format pricing is "one of the pricing knobs that Google has to adjust the search ads auction."). In 2014, Google refined its format pricing to price "on the basis of advertiser value from a format." UPX0042 at -109.

655. Although formats may make an ad more likely to be clicked, Google's "data indicates that standard formats do not meaningfully change the conversion rate" on a per-click basis. UPX0505 at -315. Google accordingly rationalized its format charges by increased predicted clicks, not increased conversions. *Id.* (proposing basing format prices on increases in pCTR). Instead of applying a fixed and transparent format surcharge, Google modified its auction to lower the LTV score of ads with formats, increasing their CPCs. UPX0042 at -109 ("The format normalizer N lowers the LTV score, and therefore increases the cost of the ad."). The additional charge varied by advertiser and auction, and Google tuned format pricing to modify the degree of inflation. *Id.*

656. Advertisers could avoid format pricing by choosing not to use formats in their ads. Tr. 4302:1–4 (Juda (Google)). Google sunset format pricing in 2019, after developing a

[redacted]

more powerful tuning knob. *Id*. 4301:15–4302:13 (discussing UPX0059 at -620); UPX0457 at -257 (describing Polyjuice launch in 2019).

657. Upon its retirement, Google replaced format pricing with a new knob called rGSP applying to all ads and all advertisers. UPX0512 at 001–02 (rGSP replaced format pricing); Tr. 4302:24–4303:5 (Juda (Google)); 4302:9–4303:5 (Juda (Google)) (advertisers cannot opt out of rGSP).

658. By the time it replaced format pricing, Google had tuned its format charges to generate approximately 15% to 20% of Google's Text Ads revenue. UPX0045 at -838–39 (format pricing "had been strongly tuned by our threshold/metrics team to generate ~15% revenue" and was "a very powerful knob which was creating 15% revenue"); UPX0512 at .002 (Format pricing "was at ~20% RPM" when replaced.); UPX0430 at -580 ("Format Pricing contributes materially to Google's overall profit – adding multiple billion dollars of incremental revenue annually.").

ii. Google Used Squashing To Increase Bid Prices And Revenue

659. In 2014, Google launched a "squashing" mechanism into its auction through a launch called "Butternut." UPX0442 at -868. Butternut reduced the delta between pCTR scores among bidders by artificially increasing the pCTR scores of all but the highest-pCTR participant. *Id.* at -869 (Butternut "pulled up" lower pCTRs "closer to the advertiser with the highest pCTR"). Butternut's pricing knob controlled the degree of inflation. *Id.* ("Butternut is introducing a new tuning knob lambda."); Tr. 4790:19–4791:20 (Whinston (Pls. Expert)) (Squashing boosts the ranking of the bidder who had the second highest pCTR.).

660. Squashing increased CPCs by reducing the impact of the pCTR quality metric on LTV and increasing the impact of the advertisers' bid. UPX0430 at -581 (Squashing "compresses the pCTRs and puts more weight on bid in the pricing/ranking function.");

[redacted]

UPX0442 at -894 ("[S]quashing moves us slightly towards a bid auction (the winner wins slightly more often due to a high bid than in the control).").

661. Because of this reduced emphasis on quality and increased emphasis on bid, Google recognized squashing "[r]anks ads sub-optimally in exchange for more revenue." UPX0051 at -241; PSX00167 at -212 ("Squashing down-weighs the importance of pCTR in ranking and can have negative user experience consequences, as well as a negative impact on the long-term incentives for advertisers to improve quality.").

662. In fact, four years before Google launched squashing, Dr. Varian cited squashing's detrimental effect on quality as a reason why "we [Google] don't do 'squashing' and never have. In fact, we have done the opposite of squashing in the AdSense auction, where we overweighted quality a bit, reducing revenue but increasing CTR." UPX0716 at -219 (emphasis removed).

663. Butternut and later squashing launches increased average CPCs. Tr. 1222:6–10 (Dischler (Google)); Tr. 8857:4–13 (Israel (Def. Expert)) ("Everything else the same and you squash, and I agree that 39 cents would go up."); UPX0520 at -821 ("We will keep the pCTR squashing of Butternut to leverage second pricing to set higher prices for pCTR winners.").

664. Although Google claims it implemented squashing to (in part) capture revenue losses caused by other innovations, the company acknowledges that squashing increases CPCs indiscriminately. UPX0442 at -869 ("One issue with pCTR squashing is that, while it does correct for the revenue loss from a SmartASS launch at an aggregate level, the revenue increase it engenders is not limited to the ads which saw a pricing decrease due to the SmartASS launch.").

[redacted]

665. Google also claimed it implemented squashing to allow "folks other than the predominant winner to break through some percentage of the time," Tr. 1386:10–1387:3 (Dischler (Google)). Google's own analysis, however, shows that "[s]quashing [didn't] change the ads we show very much," showing the same ads on about 95% of queries measured by impressions and clicks, and generating 88% of its revenue from queries where it returned the same top ads. UPX0442 at -872. Moreover, Google's internal documents show it viewed reranking advertisements as an undesirable outcome and as the "collateral damage" of squashing, not a benefit. UPX0737 at -464 ("Squashing in itself can lead to both desirable (CPC increase) or undesirable outcomes (CPC decrease, reranking) . . ."); UPX0430 at -589 ("The Squashing mechanism has high collateral damage (clicks lost due to re-ranking, and CPC decreases due to squashing against a winning ad with lower pCTR than the runner-up).").

iii. Google Uses rGSP To Increase Prices

666. In 2019, Google launched a new knob called rGSP, or "randomized generalized second price," which introduced a "randomization" mechanism into the auction. UPX0457 at -257–58; Tr. 4175:13–16 (Juda (Google)); Tr. 1222:11–22 (Dischler (Google)). Google named its rGSP launch "Polyjuice," which in the Harry Potter stories is a potion allowing someone to disguise themselves as someone else. Tr. 4180:21–4181:10 (Juda (Google)).

667. For Google, rGSP was "[a] better pricing knob than format pricing," DX0153 at -102, because, among other things, it had the "the ability to raise prices (shift the curve upwards or make it steeper at the higher end) in small increments over time (AKA 'inflation')." UPX0059 at -620. rGSP also applied in all auctions and to all advertisers, solving Google's concerns that other knobs did not apply universally. Tr. 4301:15–4303:5 (Juda (Google)) (advertisers cannot opt out of rGSP); PSX00211 at -139 ("One negative with our existing launched knobs of format

[redacted]

pricing and squashing is that they can only extract revenue on advertisers with large format combinations or queries with competition.”).

668. rGSP modified the auction so that merely winning was not enough—advertisers “have to beat the other person substantially to win for sure” and pay a higher CPC when they win. UPX0512 at .015.

669. Under rGSP, Google first runs the auction as before: calculating LTV, ranking eligible ads, and identifying the winner and runner-up. UPX1045 at -422 (rGSP starts with “top 2 LTV ads in given auction”); Tr. 5491:12–22 Jerath (Pls. Expert)) (discussing UPXD103 at 43)). However, rGSP then inflates the runner-up’s LTV while leaving the winner’s constant, or, if there is no runner up, inflates the reserve price while leaving the winner’s constant. *Id.* The degree of inflation—called “Alpha”—is rGSP’s pricing knob, which Google can tune. UPX1045 at -422 (Among the “rGSP Parameters” *Alpha* is the “pricing’ knob,” and rGSP multiplies the runner-up’s LTV by *Alpha* to determine whether to swap the winner with the runner-up based on a specific probability—another rGSP parameter.).

670. After inflating the runner up’s LTV, Google then checks to see if the original winner’s LTV exceeds even the inflated runner up LTV. Tr. 5492:8–22 (Jerath (Pls. Expert)) (discussing UPXD103 at 43); UPX1045 at -422. If so, the original winner gets the slot, but Google now computes the CPC using the runner up’s inflated ad rank instead of its original ad rank. *Id.* That is, under this scenario, the rGSP pricing knob operates to increase the auction winner’s price by inflating the runner-up LTV against which the winner’s CPC is computed. *Id.*

671. In the other scenario—where the runner-up’s inflated LTV exceeds the winner’s—Google randomly selects between the two ads (or, in the case of a reserve priced ad,

[redacted]

randomly selects whether the winner will or will not appear). Tr. 5492:8–22 (Jerath (Pls. Expert)) (discussing UPXD103 at 43); UPX1045 at -422.

672. Importantly, in either scenario, if the original winner's ad displays and is clicked, that winner will pay a higher CPC than they would have absent the rGSP mechanism:

> [C]onsider the situation where the positions are not flipped, they're not swapped. Even in that case, the winning ad's price increases. The reason is that the ad rank of the original runner-up, which is a runner-up here, so the ad rank of the runner-up is inflated. And this is a second-price auction so the price of the winner is determined by the ad rank of the runner-up. And if the runner-up's ad rank is artificially inflated, then the winner's price goes up sort of artificially.

Tr. 5492:8–22 (Jerath (Pls. Expert)).

673. Under the randomization option, the original winner's odds of being again selected as the winner are proportional to the size of the delta between the two ads' original LTV scores, and an advertiser can avoid the threat of being swapped entirely by raising its bid. Tr. 4176:21–4177:25 (Juda (Google)) (discussing UPX1045 at -393). rGSP thus incentivizes higher bidding. Tr. 5492:23–5493:16 (Jerath (Pls. Expert)); Tr. 8877:15–8878:1 (Israel (Def. Expert)) (rGSP incentivizes higher bids); Tr. 4188:22–4190:3 (Juda (Google)) (discussing UPX0059 at -620) ("If I have to say 'we randomly disable you if you don't bid high enough,' I'm going to have another bad year at GMN [Google Marketing Next].").

674. As of early 2020, an advertiser needed to have an ad rank [redacted] that of the runner-up's to avoid the risk of swapping and, in reserve-priced auctions, needed to have an ad rank [redacted] that of the runner up's to avoid the risk of being dropped. UPX0466 at -939 (The "tuning point" for rGSP Alpha was [redacted] for US Mobile in second priced auctions, and [redacted] in reserve priced auctions); Tr. 4178:8–14 (Juda (Google)) (It was "possible" the auction winner would have to bid 3.7 times higher than the runner-up to avoid swapping.).

[redacted]

675. rGSP increased Google's revenue. Tr. 1224:23–24 (Dischler (Google)). Google's pre-launch experiments indicated that rGSP would increase CPCs for top slot ads on non-navigational queries 5.91% on PCs and tablets and 4.85% on mobile phones. UPX0457 at -260 ("TopNonNavCPC" column). Experiments showed a 5.74% revenue gain persisted two months after launch. UPX0045 at -838. Given that rGSP replaced the 15% format pricing knob, this meant rGSP "replaced 15% revenue and got x% on top of that." *Id.*

676. As with squashing, Google describes the reranking scenario—i.e., where the runner-up is awarded the slot due to random reranking—as the "loss case" and the scenario where the original winner keeps the slot but pays a higher CPC as the "gain case." UPX0512 at .016.

e) Google's Use Of Pricing Knobs To Extract Advertiser Value Constitutes Direct Evidence Of Monopoly Power

677. It is not merely the presence of pricing knobs that evince Google's monopoly power, but rather Google's use of those knobs to exercise that power. Google bases its Text Ad pricing almost entirely on extracting what it called "advertiser value" from advertisers, seeking to adjust its second price auction to set advertiser prices "one penny less than the breaking point." UPX0036 at -067. Google pays little or no attention to the quality and pricing of its claimed rivals. *Infra* ¶¶ 725–727 (§ V.C.6). These are all hallmarks of substantial market power.

678. Since 2012 on desktop and 2015 on mobile, increased RPM, rather than overall query growth, has driven Google's Search Ads revenue growth and its progress towards its 20% annual objective. Tr. 7550:24–7551:18 (Raghavan (Google)) (referring to redacted figures in UPX0342 at -825 and agreeing that the majority of Search Ads revenue growth comes from RPM); UPX0342 at -826 ("RPM has become the dominant growth driver")).

[redacted]

679. These RPM increases have been largely driven by Google's Ad Quality division, including by implementing and tuning the knobs described above. Inside the team working on the auction, as of 2018, there was a "general belief" that "there's more juice in getting prices right (higher) than in improving the allocation of ads." UPX0467 at -332. Tr. 4146:4–9 (Juda (Google)).

680. Google introduced format pricing in 2012, UPX0042 at -109, when RPM began outpacing query growth on desktop. Shortly before Google's RPM growth overtook query growth on mobile in 2015, Google introduced its first squashing iteration and refined its format pricing to price "on the basis of advertiser value from a format." UPX0042 at -109. Along with rGSP, these tools enabled Google to implement long-term CPC increases. Tr.1220:5–9 (Dischler (Google)) (Format pricing tuning increased CPC on net.); *id.* 1222:6–10 (Squashing increases ad prices on average); UPX0059 at -620 (Randomization is "[e]asy to tune, with the ability to raise prices.").

f) Google's Internal Modeling And Live Experiments Demonstrate Google's Ability To Raise Prices At Will

i. Google's GammaYellow And Kabocha Experiments Show It Can Sustain Price Increases

681. In connection with a series of price-raising initiatives starting around 2017, Google conducted multiple experiments assessing advertiser response to its price increases, ultimately concluding advertiser response was low. Tr. 4791:21–4793:1 (Whinston (Pls. Expert). Google's ultimate takeaway was that if it raised CPCs, it could expect to realize approximately half the increase in its revenue (i.e., if it increased CPCs by 10%, Text Ad revenue would go up 5%). *Id.* Google, accordingly, launched multiple price increases using all three of its tuning knobs.

[redacted]

682. One such experiment was GammaYellow, which Google designed to assess its ability to sustain long-term price increases for ad formats. UPX0729 at -979 ("[T]he goal of the GammaYellow [Advertiser Experiment] was to evaluate the long-term revenue effects of raised format prices.") (emphasis omitted). GammaYellow "exposed 15% of advertisers to strongly increased format prices on non-nav google.com traffic for 6 weeks in Q2'17." UPX0729 at -979; UPX0036 at -064 ("GY [GammaYellow] was 20% on mobile on average."); Tr. 4791:21–4793:1 (Whinston (Pls. Expert)) (outlining experiments). In GammaYellow, Google "found that 50% of the initial revenue gains stuck" and "found no evidence of notable format opt-out behavior." UPX0729 at -979 (emphasis omitted); Tr. 4791:21–4793:1 (Whinston (Pls. Expert)) ("[B]asically there's what they called a stickage of 50 percent. So if they raised prices 10 percent, revenue would go up 5 [percent].").

683. Google followed GammaYellow with Kabocha, which assessed Google's ability to sustain long-term price increases through squashing and which "confirmed that the stickage factor for this knob was also . . . roughly 50%." UPX0737 at -462; *id.* at -476 (Similar to format pricing, Kabocha "showed that ~50% of the initial RPM effect [from squashing] sticks in the long term."); UPX0745 at -085 (Kabocha "validated squashing is long term revenue positive.").

684. Between these experiments—in mid-2017—Google conducted a "Macro ROI" investigation, which conducted a series of advertiser interviews aimed at assessing if "format price increases on google.com [would] influence long-term spend allocation to Google." Tr. 1276:19–24 (Dischler (Google)) (explaining UPX0519 at .001). Google concluded that "a 15% percent CPC should be ok when it comes down to the long-term budget decisions… as long as we are smart about it." *Id.* at .003. Being "smart about it" meant "don't touch brand [name

[redacted]

keywords], check for outliers, and consider gradual price increases (rather than a sudden step function).” *Id.* at .001.

685. Google reached this conclusion because the “overwhelming majority” of advertisers could not measure actual ROI, i.e., incremental sales gained from advertising, instead optimizing for other factors used as a proxy for ROI. UPX0519 at .001, .009; *id.* at .005 (defining “true ROI” as incremental revenue per dollar of ad spend). Thus, Google concluded that, when raising prices, it “should be more concerned about the perception of price/ROI changing within a channel rather than actual cross channel ROI comparisons.” UPX0519 at .001 (emphasis omitted).

ii. Momiji: Google Exercises Monopoly Power By Capturing Advertiser Value And Higher Prices

686. Following its Macro ROI analysis, Google launched “Momiji.” Momiji was a Google project through which the company sought to “better understand the impact of raising prices on our ecosystem and to make significant changes to the prices in our system if the data warranted such action.” UPX0456 at -274; Tr. 4786:7–4787:9, 4788:6–4790:17 (Whinston (Pls. Expert)) (discussing UPX0036 at -063, -067; “Momiji was trying to figure out, you know, can we raise prices, how much can we raise prices, how should we raise prices.”).

687. Momiji relied on format pricing to effectuate higher prices. UPX0456 at -274 (“Thresholds has developed two mechanisms which can effectively set better prices (Squashing and Format Pricing) . . . We chose to vet Format Pricing first because we believe it to be our best pricing knob currently available for use.”); UPX0506 at -005 (“Purpose of Momiji Format Pricing . . . Increasing Top-1 CPCs to better reflect value.”).

688. In Momiji, Google read GammaYellow and related experiments to mean that Google need not accept auctions with a so-called “runaway winner,” i.e., where the winner’s ad

[redacted]

rank was meaningfully higher than the runner-up's. Google thus sought to capture this delta (which it called "headroom") under the philosophy that, for pricing, "one penny less than the breaking point is the right amount." *Supra* ¶ 650; Tr. 4788:5–4790:17, 4789:15–4790:9 (Whinston (Pls. Expert)) (discussing UPX0036 at -067); UPX0507 at .004 ("~50 of Top-1 second price spend has > 20% LTV gap with runner up . . . GammaYellow: Prices could be higher, and we think we would keep the money . . . Revenue gain from higher prices > revenue loss from response.")

689. Google eventually launched Momiji by increasing prices for formats, which "was only able to proceed after the GammaYellow advertiser experiment validated that expensive formats was long term revenue positive." UPX0456 at -273. This took place in 2017. UPX0042 at -110 ("July 2017: Project Momiji effort to tune AlphaRed for lots of long-term revenue."). Momiji increased prices for the typical advertiser. Tr. 1274:16–1275:3 (Dischler (Google)).

690. Google raised prices on formats in Momiji because it felt format pricing was its "best knob to engender large price increases." UPX0507 at .026. Google's Momiji launch review states explicitly that it did not have a principled basis for choosing the amount of the increase: "Most gains are in Top-1 [ad position], where we have no way to say what formats should cost." UPX0507 at .026.

iii. Google Used Holistic Pricing To Increase Prices

691. Google's "Holistic Pricing" effort sought to identify areas where prices were "unusually low" relative to where Google believed prices should be. Tr. 4127:8–12 (Juda (Google)). Through Holistic Pricing, Google sought to "develop a holistic plan for a series of pricing increases using existing knobs (Format Pricing, Squashing) and new mechanisms on Google.com and AFS." UPX0042 at -117. The initiative ultimately led to a series of pricing launches that "increas[ed Google's] revenue by billions with more appropriate prices." UPX0454

[redacted]

at -642; Tr. 6155:25–6158:7 (Whinston (Pls. Expert)) (Google's "goal" in Holistic Pricing was "to make sure that whatever improvements there were for advertisers, Google got all of it.").

692. Google's Holistic Pricing initiative began in early 2018 and ended in late 2019. UPX6015 at -314, -320–21. It proposed a series of "lenses" or "tools" to assess Google's long-term power to maintain price increases: UPX1054 at -052–54.

693. One Holistic Pricing tool/lens was "Long Term Response Measurement," including experiments intended to assess the "stickage" of price increases. UPX1054 at -052.

694. Second, Google contemplated quarterly Holistic Pricing tunings, which would, each quarter, tune the auction to increase CPCs and extract any "value-price mismatch" Google assessed it had created in the prior quarter. *Id.* at -054, -074.

695. A third involved an ongoing "ROI Perception" study, where Google's CX Lab division would conduct a series of interviews with a cohort of advertisers before and during the quarterly tunings to assess if the price increases affected the advertisers' "perception" of Google search ROI. *Id.* at -053.

696. Finally, Google sought to create a Search Ads price index that would enable it to track CPCs over time. *Id.; supra* ¶ 635. This tracking would allow Google to assess if it could increase price.

697. Google first assessed long-term advertiser reaction to price hikes with "AION," a March 2018 experiment which—similar to GammaYellow—increased format pricing on a cohort of advertisers, but which lasted for [redacted]. UPX0745 at -085; UPX0737 at -462. After three months, AION's results mirrored GammaYellow's: "Spend response trends to the 15% change have stabilized at roughly half the initial gains." UPX0737 at -462; Tr. 4791:21–4793:1 (Whinston (Pls. Expert)) (three-month pricing experiment showed limited advertiser response to

[redacted]

price increase). AION concluded after [redacted], showing Google's format price increases persisted throughout its [redacted] run. UPX0509 at -958 (AION showed "that [redacted] spend stickage to a detectable price increase matched shorter 6 week responses.").

698. Google implemented six "Holistic Pricing Quarterly Tunings" between July 2018 and November 2019. UPX6015 at -314, -321–23 (describing Potiron (July 2018), SugarMaple (Sept. 2018), Q4 2018 HP Tuning, Q1 2019 HP Tuning, July 2019 Excess CPC Tuning, and Polyjuice (Nov. 2019)). Google's CX Lab contemporaneously performed four rounds of ROI Perception interviews, including three between February and July 2018, and a follow-up round with a different cohort of advertisers in August 2019. DX0187 at -614, -691; DX0119 at -388. The interviews' stated purpose was to "inform[] holistic pricing effort on how we should think about long term response implications." DX0187 at -691. The 2018 interviews "raised no red flags" related to the ongoing Holistic Pricing work, and the 2019 interviews remained largely consistent with the 2018 work. DX0187 at -693, -622–25.

699. Google's ROI Perception interviews assured Google that its price increases did not lead to advertisers' shifting away from Google; advertisers viewed "things in the world or what they've done, not something happening on the back end" at Google as responsible for the price increases. UPX0737 at -464; UPX1054 at -060–61 (Advertisers faced with CPC changes "dominantly attribute these shifts to themselves, competition and seasonality (85%+)- not Google.").

700. Through the Holistic Pricing Quarterly Tunings, Google sought to ensure that advertisers would not benefit from any changes to Google's advertising products that increased the click-through rate on its Text Ads. Tr. 10475:9–10476:21 (Whinston (Pls. Expert)) ("So what Google sought out to do was to say, no . . . we're increasing clicks, we're going to make -- we're

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going to raise prices to make sure advertisers are not gaining from that, like, we're going to be the ones who gain from it") (discussing UPXD106 at -007–08).

701. Google seeks to price its Text Ads so that each additional click an advertiser receives costs more in CPC than the previous one. Tr. 6032:8–6033:19 (Whinston (Pls. Expert)) ("[I]f I get more bananas at the store, I pay more in total, but my price per banana hasn't gone up. In these auctions, it's as if my price per banana does go up"); Tr. 6032:25–6033:3 (Whinston (Pls. Expert)) (describing click cost curve). But Google has no reason to believe the additional, more expensive clicks are more likely to convert than earlier clicks. Tr. 6034:1–6 (Whinston (Pls. Expert)) ("Q. This is a more valuable banana, right? A. You know, it's not clear.") (analogizing bananas to ad formats). In fact, Google recognizes the opposite: its concept of advertiser value means that "ROI should decline with [click] volume." UPX0430 at -589; UPX0520 at -816 ("ROI should decrease monotonically with click volume (i.e. marginal CPC should increase monotonically with volume).").

702. Google's Holistic Pricing Quarterly Tunings sought to ensure advertisers' CPCs would increase at the same rate both before and after a launch, such that Google would extract the entire benefit of a value-generating launch. 6155:25–6158:9, 6158:18–6159:2 (Whinston (Pls. Expert)). Google did this using a newly-created metric called Excess CPC or Negative Excess CPC. 6155:25–6158:9, 6158:18–6159:2 (Whinston (Pls. Expert)) (Holistic Pricing used Excess CPC to ensure "that whatever improvements there were for advertisers, Google got all of it.").

703. For example, Google's first Holistic Pricing Quarterly Tuning—"Potiron"—sought to increase CPCs Google believed were "underpriced," but noted that "by underpriced we mean that the cost of incremental clicks did not rise along with volume following the original

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click cost curve." UPX0737 at -462. Google accordingly used the squashing knob to increase CPCs for those incremental clicks. *Id.* at -461 (Potiron adjusted auction to capture Excess CPC).

704. Google's second Holistic Pricing Quarterly Tuning—"SugarMaple"—similarly tuned the auction to ensure "that in aggregate 100 clicks stay $X while making sure the incremental cost of clicks increases in a consistent fashion," this time using the format pricing knob. UPX0039 at .002. Put differently, SugarMaple was "all about keeping the current tradeoffs stable." *Id.* The experiment results for SugarMaple predicted a 3% increase in CPCs for top ads, a minor drop in the click through rate for top ads, and no other changes related to the launch. Des. Tr. 178:20–179:6 (Miller (Google) Dep.) (discussing UPX0521 at -901).

705. Holistic Pricing raised aggregate CPC prices. Tr. 4127:24–4128:23 (Juda (Google)) (acknowledging prior statement that the sum of the "aggregate change in aggregate CPCs" was possibly positive); UPX0042 at -107 ("[O]ur belief, based on analyses of the system and from advertiser experiments, is that there is a lot of opportunity to increase prices for search ads. . . We call this work value based pricing.").

g) Google Exercised Pricing Power To Meet Revenue Goals

706. Google has used pricing knobs and other mechanisms to raise price when necessary to meet its quarterly goals. Tr. 1215:10–1216:23 (Dischler (Google)) ("shaking the cushions" to generate revenue and meet quarterly forecasts, with reference to email in UPX0522 at -193).

707. One example was the "Code Yellow" called on February 5, 2019, by Mr. Dischler across Chrome, Search, and Ads because Google's revenue was weaker than expected. UPX0738 at -406; Des. Tr. 205:10–15 (Miller (Google) Dep.). At Google, a Code Yellow occurs when an issue arises that requires extra engineering or sales efforts to address. Des. Tr. 66:18–22 (Miller (Google) Dep.).

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708. Mr. Dischler's Code Yellow notice (1) explained that the timing of "revenue launches" was behind the prior year and (2) formulated a workstream whose "top priority" was to "deliver Q1 revenue launches during February." UPX0738 at -406.

709. Shortly thereafter, Google Vice President of Ads Finance Andy Miller sent a status update identifying three ad launches to close the revenue gap, including two auction changes "around pricing and ad load." Des. Tr. 207:16–23, 208:3–22 (Miller (Google) Dep.) (discussing UPX0514 at -386).

710. By March 22, 2019, Google had met the criteria to exit the Code Yellow, due in part to a format pricing launch known as SugarShack. UPX0733 at -203 (Code Yellow ends "with the launch of 'Sugarshack.'"). With SugarShack, Google's Search Ads team had "launched all projects necessary to push the team over the quarterly estimated 5% long term incremental RPM target," thereby fulfilling the Code Yellow goals. UPX0733 at -203–04; Des. Tr. 209:22–210:2 (Miller (Google) Dep.) (identifying UPX0733 at -203–04 as the e-mail announcing that the ads team had met the exit criteria for the code yellow); Des. Tr. 211:2–21 (Miller (Google) Dep.) (SugarShack assisted with end of Code Yellow).

h) Google's Ads Quality Division Has Met An Annual Goal Of 20% Revenue Increases In Search Ads

711. Google expected its Search Ads team to implement launches generating at least 20% in "revenue innovation" annually. Tr. 4153:6–4154:4 (Juda (Google)). Google formalizes this 20% requirement in an OKR (Objectives and Key Results). Tr. 7547:6–14 (Raghavan (Google)) (Search Ads team has an OKR seeking 20% revenue growth for Search).

712. Largely because of efforts by its Ads Quality team, the Search Ads team has consistently met its 20% goal. Tr. 4140:25–4141:3 (Juda (Google)); *id.* 4130:15–4131:12 (explaining UPX0467 at -331 and agreeing that the "overwhelming majority" of the Search Ads

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20% RPM OKR has been driven by the Ads Quality Team); Tr. 7549:6–9 (Raghavan (Google)) (reviewing UPX0342 at -824).

i) Google's Lack Of Pricing Transparency

713. Google's ability to maintain a lack of transparency into its pricing mechanisms, against the will of and to the detriment of advertisers, is further evidence of its monopoly power.

i. Google Does Not Disclose Its Pricing Launches

714. Google does not disclose its pricing launches to advertisers. Tr. 1226:13–17 (Dischler (Google)) ("We tend not to tell advertisers about pricing changes."). This impedes advertisers' ability to respond and optimize their bidding strategies.

ii. Google's Own Employees Could Not Understand Its rGSP Disclosure

715. Google claims it publicly disclosed rGSP by editing an online help page to contain the following language:

> The competitiveness of an auction - If two ads competing for the same position have similar ad ranks, each will have a similar opportunity to win that position. As the gap in ad rank between two advertisers' ads grows, the higher-ranking ad will be more likely to win but also may pay a higher cost per click for the benefit of the increased certainty of winning.

UPX6058 at -003; Tr. 4278:14–4279:7 (Juda (Google)) (describing UPX6058, stating that "[t]his appears to be a description of the rGSP launch").

716. However, Mr. Miller, when presented with his own email containing the purportedly disclosing language and other internal information, could not explain how rGSP functioned, acknowledged the language was "confusing," and when directly asked if "there was a randomization component introduced into the auction in connection" with the launch, responded "I don't know if it was a randomization. I don't know the mechanism that we used to try to do this." Des. Tr. 192:13–24, 193:5–194:16 (Miller (Google) Dep.) (discussing UPX2020 at -938).

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717. Google specifically refrained from broadcasting a disclosure of rGSP to its sales staff. UPX2020 at -938 ("Relevant GTM and finance leads have been notified in region, but we are not broadcasting this change to sales given there is no action required and no change to how advertisers should continue to manage their Google Ads account."). Des. Tr. 196:5–20 (Miller (Google) Dep.) (discussing UPX2020).

iii. Google Limits Visibility Into Its "Black Box" Auctions

718. Google provides limited visibility into its ad auction and the quality metrics it assigns ads and advertisers. As a result, if an advertiser wants to increase its ad position in the shorter term, the advertiser's only viable option is to increase its bid. Des. Tr. 221:7–222:8 (Alberts (Dentsu)) (If an advertiser's quality score is "not a ten out of ten," it must make sure it bids enough to achieve top placement.); Tr. 5488:2–5489:10 (Jerath (Pls. Expert)) ("[A]s a practical matter, what the advertisers have to work with is the bid, because that has impact in the short term").

719. Google's self-controlled auction and ad serving system is opaque to advertisers, who view it as a "black box." Tr. 3850:12–18 (Lowcock (IPG)) (Google Search is a "black box" because advertisers "have no true visibility into the way that the price is determined or how the auction is conducted."); *id.* 3829:16–3830:20 (naming increasing floor prices, advertisers paying for more keywords, and changes to bidding systems as possible reasons--among a "myriad of reasons" for advertising price increases); Des. Tr. 109:10–110:5 (James (Amazon) Dep.) (Google controls the terms its Text Ad and shopping ad auctions); *id.* 147:19–149:5, 149:17–150:23, 154:17–23 ("[T]he bidding system itself [for Text Ads], the black box, we don't have concrete knowledge in terms of how it functions. . . [T]his is a proprietary technology that Google owns and so it is a black box. . . I would refer to both [Text Ad and shopping ad] auctions as being

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black boxes."); Tr. 5484:14–5487:13 (Jerath (Pls. Expert)) (discussing UPXD103 at 42). Google agrees:

Figure 10: Google's Black Box

UPX0925 at -765.

720. For example, as described above, LTV is central to Google's ad mechanism, yet Google does not tell advertisers how Google calculates LTV or what the actual LTV is for any specific ad. Tr. 4293:3–4296:3 (Juda (Google)) (discussing DXD-11 at .009 and explaining that advertisers only know the exact value of the bid); *id.* 4043:19–4044:7 (Google provides neither the details of its LTV calculations nor the final LTV values to advertisers.); Des. Tr. 216:16–220:13 (Alberts (Dentsu) Dep.) (Advertisers lack "direct visibility" into Ad Rank quality metrics); Des. Tr. 256:8–257:2 (James (Amazon) Dep.) (Auction history would enable Amazon to better optimize bidding.); Tr. 5484:14–5485:1 (Jerath (Pls. Expert)) (discussing UPXD103

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at 42). Advertisers have complained to Google about this. Des. Tr. 257:3–8 (James (Amazon) Dep.).

721. The information Google does provide to advertisers regarding Google's ad auction is not actionable. Tr. 5485:2–5487:13, 5488:2–5489:10 (Jerath (Pls. Expert)) (discussing UPXD103 at 42). Google provides advertisers a "Quality Score" of 1 through 10 for their ads on a keyword basis, but the score (a) is an aggregation of already heavily aggregated components, and (b) is not actually used in any individual auction. Tr. 5485:2–16 (Jerath (Pls. Expert)) (discussing UPXD103 at 42); Tr. 4013:10–22, 4014:2–7 (Juda (Google)); Des. Tr. 154:24–155:10 (James (Amazon) Dep.) (Quality Score is only "a loose interpretation of how Google deems the quality of the ad to be.").

722. An advertiser's price for its Search Ads is not affected by the Quality Score provided to advertisers, but instead by the more specific quality signals used in the auction itself. Tr. 4020:6–13 (Juda (Google)); UPX0010 at -061–62 & n.34 (describing actual quality metrics used in auction); UPX8025 at .001 ("Quality Score is not a key performance indicator and should not be optimized or aggregated with the rest of your data. Quality Score is not an input in the ad auction.").

723. Advertisers thus cannot use Quality Score to optimize advertising and bidding. Google acknowledges this, stating "Quality Score is too coarse and can't be used for fine-tuning." UPX0454 at -645; Tr. 5485:2–16 (Jerath (Pls. Expert)) (discussing UPXD103 at 42); Des. Tr. 258:2–258:13 (James (Amazon) Dep.) ("[Q]uality score is a collection of different metrics and therefore it makes it hard for us to understand how we might interpret quality score or use it to our advantage.").

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724. As another example, Google provides advertisers heavily aggregated metrics identifying their predicted click-through rate, ad relevance, and landing page quality as above average, average, or below average. Tr. 5485:17–5487:13 (Jerath (Pls. Expert)) (discussing UPXD103 at 42). The metrics provided to advertisers are based on only the subset of queries matching the advertiser exactly and are aggregated over 90 days; these limits make the metrics impossible to use for short-term response and largely useless. *Id.*

6. Google Does Not Consider Its Competitors When Pricing Or Making Other Changes To Its Text Ads Auction

725. Google's analysis into the effects of CPC increases fails to consider the pricing of Google's rivals. Tr. 4292:14–16 (Juda (Google)) ("not aware of anyone at Google ever doing any analysis of pricing of Search Ads at Bing"). As it acknowledges internally, Google has "never really had market pressure to clean up advertising." UPX0461 at -732.

726. Although advertisers and other industry participants view Bing as Google's primary search competitor and seek to split budgets between the two, *supra* ¶ 588, Google performs no analysis of Bing's auction model or of the pricing of Search Ads at Bing, nor has Google performed such analysis in the past. Tr. 4292:9–16 (Juda (Google)). Similarly, Google's Text and Search Ads algorithms lack any variable incorporating the cost of advertising on other digital platforms into Google's calculation of Search Ad prices. Tr. 4290:20–4291:1 (Juda (Google)) (responding to question from Court).

727. Google's internal considerations of its ability to continue to meet its annual Search Ads revenue growth targets do not identify competitors or competition as obstacles to that goal. Tr. 4148:8–4149:7 (Juda (Google)) (discussing UPX0467). Google's extensive process for considering and testing user interface changes related to Text Ads includes no consideration of competition with Facebook. Des. Tr. 202:17–24 (Jain (Google) Dep.). Also, Google did not

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consider Bing when making decisions about its own ad load. Des. Tr. 79:21–80:10 (Fox (Google) Dep.).

VI. GOOGLE'S CONTRACTS LOCK UP IMPORTANT ACCESS POINTS

A. Google's Apple Contract Is Exclusive

1. The ISA Locks Up Safari's Default—The Most Important Search Access Point On Apple Devices

728. Google views the Safari default position as of "paramount" importance. UPX0085 at -336; Tr. 1655:7–1657:4 (Roszak (Google)) (agreeing Safari default distribution is "important"). This single search access point accounts for approximately 28% percent of all U.S. general search queries. Tr. 5763:14–22 (Whinston (Pls. Expert)); UPXD104 at 36. Google pays Apple billions of dollars each year to ensure that Google is the only preset default search engine in this position across all devices and browsing modes, and in nearly every country. *Supra* ¶¶ 210, 223–224; *infra* ¶ 936.

729. Apple does not preinstall any third-party applications, including any third-party web browsers, on its devices and does not foresee any scenario in which it would do so. Tr. 2455:4–2456:10 (Cue (Apple)) ("As I've said, from the very beginning, we haven't done it, and I don't see any scenario in which we would."); Des. Tr. 92:15–18, 92:21–22 (Apple-EC 30(b)(6) Dep.) (There is nothing a third party could offer Apple to have an app preinstalled on Apple devices because Apple "would never do it."). Apple's position is well known in the industry. Tr. 7667:20–7668:18 (Pichai (Google)) (Apple's position against preinstalling third-party apps is common knowledge.); Tr. 10189:17–10190:5 (Murphy (Def. Expert)) (Apple does not preinstall third-party apps, and Google considers this fact when determining what revenue share to pay Apple.).

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730. Due in part to this policy, the Safari default is the most prominent and commonly used search access point on Apple devices. Approximately 80% of queries performed on iOS devices are performed on Safari. UPX0138 at -119 ("80% of iPhone searches are from Safari. Significant risk if default engine is changed."); UPX2051 at -519 ("How do users reach Google on iOS? Through Safari."); *id.* (from 2017 to 2020, 81% of daily active users on iOS reached Google through Safari). Most queries performed on Safari are entered into the Safari address bar and sent to the default GSE. UPX1050 at -894 (as of 2016, 65% of Google's queries from Apple devices were Safari default queries, and 13% were Safari non-default queries); Tr. 5714:5–14 (Whinston (Pls. Expert)) ("[T]he Safari default is responsible for the lion['s] share of queries on Apple devices. . . [it] really is where the vast majority of queries are being entered."); Tr. 2493:14–2494:13 (Cue (Apple)) (agreeing that the "vast majority" of Apple's revenue from Google comes from queries flowing through Safari rather than Google's Search App or Chrome).

731. Relying on Safari is a "deeply ingrained habit" for Apple device users. UPX1049 at -232. Apple promotes this habit by setting Safari as the default browser and placing it in the hotseat on all Apple devices. UPX0138 at -130 ("Use[rs] prefer Safari because it is default[.] . . . Old habits dies hard."); UPX0139 at -151 (iPhone users with Safari on the app dock outnumber iPhone users with the Google Search App in the app dock about four-to-one, which "is a big advantage" for Safari).

732. Maintaining its control of the Safari default is enormously important to Google. In 2015 and 2016, during negotiations to amend and extend the ISA, Google treated the risk that Apple would switch the Safari default to another search engine as a "Code Red" event: a serious issue requiring immediate response. UPX0144 at -934 ("Code Red = DSE switch away from Google on iOS Safari"); Tr. 1616:20–1617:4 (Roszak (Google)); Tr. 1658:3–21 (Roszak

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(Google)) (discussing UPX0085 and Project Soy, an internal Google project to encourage iPhone users to be less reliant on the Safari default); UPX0085 at -228, -230, -240 (discussing the "Code Red Playbook" that Google would activate in the event of a Safari default switch); UPX0171 at -169, -177 ("Soy Code Red Plan" explaining that Google was "vulnerable" if Apple switched the Safari default); Tr. 536:10–537:21 (Rangel (Pls. Expert)) (discussing UPX0171 at -169, -177).

733. If Apple switched the Safari default in 2016, Google expected to lose more than $28 billion in the following five-year period. UPX1050 at -887 (calculating net revenue losses between $28.2 billion and $32.7 billion if the Safari default switched); Tr. 1629:19–1631:18 (Roszak (Google)) (discussing UPX1050). Given the magnitude of this risk, Mr. Pichai, Google's CEO, became "extensively involved" in negotiating the 2016 ISA. Tr. 7659:15–20 (Pichai (Google)).

734. The existence of bookmarks in Safari linking to other GSEs does not undermine the power of the Safari default position and has not stopped Google from paying billions for it. To search through a bookmark, a user must open a new tab or page on Safari, click on the bookmark, arrive at the search engine's organic webpage, and enter the query on that webpage. Tr. 10101:19–21 (Murphy (Def. Expert)). Clicking on a bookmark does not change the browser's default search engine. *Id.* 10102:15–17. Instead, a user must perform extra clicks every time he or she conducts a search using a Safari bookmark. *Id.* 10102:18–24.

735. In addition, Safari's bookmarks change as the device is used. The bookmarks appearing out-of-the-box are replaced by bookmarks for websites that a user frequently visits or has set as favorites, and these replacement bookmarks carry over when the user purchases a new device. UPX0585 at -040 ("[W]hen existing customers enter their Apple account information on a new device, then the default bookmarks are replaced by others reflecting their favorites or

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history"); UPX0942 at -589 ("Favorite bookmarks in Safari are tied to a user's iCloud account. If a user purchases a new iPhone or Mac and configures it with their iCloud account, the default bookmarks will be replaced by those associated with the account").

736. Google has been willing to pay billions for the Safari default position despite the existence of these bookmarks. Tr. 10102:25–10103:5 (Murphy (Def. Expert)) (Google was aware of Safari bookmarks when Google signed the current ISA).

737. The existence of downloadable search apps also does not undermine the power of Safari's default. To search from these apps, users must be aware that they can download them from the app store, make a conscious decision to do so, and undertake the download process. Des. Tr. 139:20–23, 140:1–24 (Baker (Mozilla) Dep.) ("[M]erely having an app in the app store is a very difficult way to compete with preloaded defaults" because "each person who gets that phone has to make a conscious decision and go through a lot of work to get your product."); Tr. 617:23–618:17 (Rangel (Pls. Expert)) (The availability of rival search apps in mobile app stores does not undermine the power of Google's search defaults because choice friction is still involved.). As of 2018, more than 35% of iPhone users did not even know they could download the Google Search App. UPX0139 at -149. Of those that were aware that they could do so, the majority did not see a need and instead continued using Safari. *Id.*

738. As Apple acknowledges, the process of finding and relying on downloadable search apps provides an inferior user experience compared to conducting searches on Safari. Tr. 2494:16–2495:23 (Cue (Apple)) ("In the Google Search app scenario, most people are sitting on a browser, they don't really want to go search on an app or a different app from that standpoint"); *id.* 2496:6–10 (A downloaded search app does not provide as good an experience as the Safari browser.).

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739. Moreover, the ISA's exclusive default requirement is not limited to Safari. If Apple ever launched another browser or any other "browser-like technology," Apple would be required to preset Google as the only default search engine there as well. *Supra* ¶ 223.

2. The ISA Prohibits Apple From Adopting Designs That Would Promote Choice In Search

740. The ISA's exclusive default requirement prohibits Apple from designing its products in ways that would promote competition. For example, Apple may not offer a choice screen, may not offer a different default in Safari's private browsing mode, may not offer different defaults by device, and may not offer a different default in the United States versus the rest of the world. *Supra* ¶¶ 223–224; Tr. 5713:18–5714:4 (Whinston (Pls. Expert)) (discussing UPXD104 at 6).

741. Apple has sought repeatedly to loosen these restrictions. Joan Braddi, Google's partner advisor for Apple, noted during the parties' 2013 negotiations that Apple's "wants" included a "limited obligation and total flexibility," while Google's "wants" included a "[c]lear articulation of when we will be set as Default to be sure we are made whole; no direct or indirect payments from competitors if [Apple] offers/encourages the user to change settings. No offering users options during a search." UPX0679 at .001. This divergence in the companies' "wants" has appeared repeatedly in their negotiations. Tr. 4977:13–17 (Braddi (Google)) (the disagreements reflected Apple's "wish list"); Tr. 10023:23–10024:1 (Murphy (Def. Expert)) (when considering the competitive effect of a contract, the agreement's history of negotiation can be important); *id.* 10024:7–11 (a party's proposal shows what the party's interests are, even if it doesn't make it into the final contract).

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a) Google Did Not Allow Apple To Offer A Choice Screen

742. Google has long recognized that providing users with a choice screen to select their default search engine is good for both competition and consumers. When Microsoft introduced a new version of Internet Explorer in 2005 that would set Microsoft's search engine as the default for most users, Google "proposed instead that users be prompted to select the default search provider the first time they use the inline search feature," which would "eliminate[] any company's own self interests and place[] control in the hands of the end user, where it belongs." UPX0172 at -731. Google proposed such a choice screen because "most end users do not change defaults." *Id.*

743. At that time, Google believed that fairness required a dominant firm to offer users a choice screen to select their default search engine and that failure to do so would "harm the competitive process." UPX0172 at -732; Tr. 7682:22–7684:2 (Pichai (Google)); *id.* 7686:1–6 (agreeing that "a choice screen would get closer to user preference" and that "Google believed that a choice screen had benefits for the user"); UPX0172 at -732 (By setting its own search engine as the default "Microsoft would gain a large number of search users for reasons having nothing to do with the merits of Microsoft's search offering.").

744. In other contexts, Google has celebrated the adoption of choice screens. UPX2143 at -309–10 (Google 2010 email circulating Mozilla CEO Mitchell Baker's blog post praising the EU's implementation of a browser choice screen, which meant that Windows-PC users in Europe would be allowed to choose their default browser); *id.* at -308 (celebrating press coverage of the EU browser choice screen and projecting associated gains in Chrome usage); UPX2087 at -697 (Board of Directors document describing the EU's implementation of this "browser ballot" as a "victory for users" and an "opportunity for Chrome").

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745. Google's affection for choice screens does not extend to the default search position in Safari. The ISA prohibits Apple from implementing a choice screen that would allow users to choose their default search engine. *Supra* ¶ 223 (Apple must set Google as the default search engine for all search queries performed in Safari.); Tr. 2476:2–2477:4 (Cue (Apple)) (ISA does not permit a choice screen for Apple users to set their default search engine out of the box); Tr. 5713:18–5714:4 (Whinston (Pls. Expert)) (discussing UPXD104 at 6).

746. Apple routinely makes decisions on when to present users with choices. Tr. 2475:22–2476:1 (Cue (Apple)) (discussing UPXD009). When setting up their iPhones out-of-the-box, users are presented a series of choice screens, including one for selecting text and icon size. Tr. 2471:22–2472:25 (Cue (Apple)) (discussing UPXD009). The first time Apple users open the Apple Maps app, they are presented with a choice screen to select their preferred privacy level when using that app. Tr. 2473:1–24 (Cue (Apple)) (discussing UPXD009). Under Apple's tracking-transparency initiative, every app that wants to track a user's data must provide a choice screen so the user can opt in or out of tracking. Tr. 2473:25–2475:7 (Cue (Apple)) (discussing UPXD009).

747. In 2007, Apple considered introducing a version of Safari for Windows that would present users with a choice screen to select their default search provider. UPX1033 at -990 ("When an end user installs Safari on a system for the first-time, the end-user will be given the opportunity to select which Default Provider they would prefer," including for the "[d]efault search setting in the Safari search field."); *id.* at -990 ("I assume this would be during one of the following: the installation process, upon first launch of the browser, or on the download page."). Apple discussed the Safari choice screen with Yahoo. UPX1034 at -992. The Apple-Yahoo discussions progressed to the point that, in May 2007, Apple prepared and sent Yahoo a license

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agreement that would provide for Yahoo's participation in the choice screen. *Id.* at -995 (draft agreement containing proposed term that states, "Apple agrees that when Apple distributes the Yahoo Search Settings in Apple Software pursuant to this Agreement, on first launch or set-up of such Apple Software, the Apple Software will provide a fair means for the user to choose the default search service that will appear to such user within the Apple Software."). Yahoo reacted positively to Apple's proposal, and on May 27, 2007, Yahoo told Apple that it hoped to finalize an agreement that included this language in the "coming week." UPX1032 at -459.

748. Just days later, Apple approached Google about amending the ISA to give Apple "sole discretion" to either make Google the default search engine or provide a user choice screen. UPX0677 at -121 (June 1, 2007 email attaching Apple's "proposed amendment to the contract which allows end-users the option to choose their search default in Safari"); UPX0678 at -122 (draft amendment to ISA containing proposed term that states, "[o]n first launch or set-up of [Safari], Apple, in its sole discretion, may either make Google the default web search provider appearing within the Search box of the Software, or provide a means for the user to choose the default web search provider").

749. Google's Executive Management Group—including Ms. Braddi, Mr. Brin, and Mr. Pichai—rejected Apple's request to amend the ISA to allow for a choice screen. UPX0126 at -240 (June 4, 2007 presentation for Executive Management Group stating, "Current deals terms: Google default (and exclusive) search provider in Safari browser"; "What Apple wants: . . . Google to be one of two possible choices for search provider (not default); user required to choose search provider prior to using browser"); Tr. 7689:4–18 (Pichai (Google)) (discussing UPX0126 and agreeing that Apple was considering implementing a choice screen on Safari for Windows); UPX0137 at -688 (listing Brin, Braddi, and Pichai as attendees at Executive

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Management Group meeting). Google rejected this request because "[d]efaults have strong impact" and it was "not going to pay for [a] non-default deal." UPX0137 at -688–89 ("How much difference default status makes? *Typically 75% take rate."). Instead, Google told Apple "no default, no rev share," making clear this was a "take it or leave it" offer. UPX0137 at -689; Tr. 7691:19–7692:23 (Pichai (Google)) (The result of the EMG discussion in UPX0137 was to tell Apple: no default, no rev share.); Tr. 4984:11–18 (Braddi (Google)) (discussing UPX0072) (Google made a "take it or leave it" offer and Apple "took it"); UPX0072 at -216 (Google gave Apple two options: "1) No default placement - no revenue share on Safari/Windows. 2) Yes default placement – we will share in revenue under the current contract.").

750. The dispute regarding Apple's ability to offer a choice screen on Safari for Windows reached the highest levels of both Google and Apple. Google co-founder Sergey Brin personally informed Apple CEO Steve Jobs that Google was "not interested in paying for non-default." UPX0561 at -263. In response to Google's position that it would not pay for "non-default," Apple removed the proposed choice screen language from its draft agreement with Yahoo and replaced it with language permitting Apple to set another provider (Google) as default instead. UPX1035 at -127.

751. Apple ultimately signed an extension of the ISA applying the agreement to Safari for Windows and requiring Apple to set Google as default on this new platform. JX0004 at -647–48 (§§ 1, 5) (Apple ISA (2007 amend.)).

b) Google Did Not Allow Apple To Set An Alternative GSE As The Safari Homepage

752. In June 2007, Mr. Pichai and Ms. Braddi became concerned by an iPhone demonstration that showed Yahoo as the homepage on Safari. UPX0672 at -475; Tr. 4989:21–4991:3 (Braddi (Google)). Google realized that Apple had identified "something that wasn't

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covered" by the exclusive default provisions of the ISA and that might lead consumers to use Yahoo's search box instead of Google's. Tr. 4991:16–23 (Braddi (Google)).

753. Following the demonstration, Google sought to add new language to the ISA to prevent Apple from setting a search engine other than Google as the default homepage in Safari. Google sent Apple proposed contract language giving Google "the right to terminate the Agreement . . . if Apple provides a non-Google web search service in the default start page of [Safari]." UPX0604 at .003. This proposal was intended "to address [Google's] concern that [Apple] could add a start page to the iPod and/or iPhone which effectively supersedes the significan[ce] of our default search deal." UPX0671 at -592. Apple was "surprised" by this addition and pushed back on Google's request, telling Google: "[w]e have no deal on start pages in our products, that cannot be a term in this one." UPX0671 at -593.

754. Despite initial objection by Apple, Google secured revised language that achieved the same result. In 2007, the parties amended the ISA to include new language stating that Apple would violate its default obligation under the ISA if it set another GSE, such as Yahoo, as the Safari homepage. JX0004 at -648 (§ 5) (Apple ISA (2007 amend.)); UPX0640 at -504 (explaining language in draft ISA amendment and stating, "if Apple places a start page at the beginning of the browser experience and the default search Is not google on such a page, then we will no longer be considered in Default position"); Tr. 4992:4–10 (Braddi (Google)) (Apple abandoned the idea of a Yahoo homepage.).

c) Google Did Not Allow Apple To Offer Multiple Versions Of Safari With Different Defaults

755. Also in 2007, Apple considered creating different versions of Safari that would default to different search engines depending on the company from which the user downloaded the browser. UPX0964 at -877. If a user downloaded Safari from Google, the browser would

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default to Google search; if the user downloaded Safari from Yahoo, it would default to Yahoo search. *Id.*

756. During the 2007 ISA negotiations, Mr. Pichai raised concerns that Apple's plans to introduce two versions of the Safari browser—one with Google set as default, and one with Yahoo set as default—was another loophole that would allow Apple to collect revenue share while also giving users a choice of default search engines. UPX0552 at -820 ("In the past [Apple] had mentioned offering two versions of Safari - Google version and Yahoo version. So one concern is they actually position this as two browsers - Safari - Google and Safari - Yahoo in which Google and Yahoo are the default respectively. They really are not making us the default as the user can choose between the two versions but get the rev share per the contract."). Google was "afraid" that creating two versions of Safari with different default search engines was Apple "cover[ing] their 'choice' option which nets no payment from us in a form that looks like default but is really choice." UPX0670 at -300.

757. During the parties' ISA negotiations, Google sought to ensure that the renegotiated contract would prevent Apple from introducing different versions of Safari with different default search engines. UPX0670 at -300 ("Pls ensure the language is clear wrt default – ensure there are not 2 versions of the browser (ie an option with Y to get around the default and payment issue."); Tr. 4988:12–19 (Braddi (Google)) (Braddi's "concern was covering for Sundar who was concerned that they were trying to do two different browsers with two different selections for default" and addressing "what Sundar wanted protection against."). Accordingly, the 2007 ISA required Google to be preset as the default search engine in *all* versions of the Safari browser. JX0004 at -647–48 (§§ 1, 5) (Apple ISA (2007 amend.)) (adding new definitions of "Software" and "Default" to the ISA).

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d) Google Refused Apple's Requests To Have "The Option But Not The Obligation" To Set Google As The Default

758. Two years later, Apple again sought flexibility regarding Safari's default. In 2009, Apple proposed an amendment to the ISA that would provide Apple with "the option but not the obligation" to set Google as the default search engine in Safari. UPX0675 at -250; UPX0615 at -248 (forwarding Apple's proposal internally); UPX0605 at -269 ("New Apple Ask: The option but not the obligation to set Google as the default search provider."); Tr. 4995:23–4996:2 (Braddi (Google)) (Apple was seeking "flexibility").

759. Without a requirement to set Google as default, Apple would have been free to pursue whatever solution it thought was best. Tr. 5000:16–5001:7 (Braddi (Google)). For example, Apple's proposed contract language would have permitted Apple to set Google as the default search engine only in some locations, only on some devices, or only in some versions of Safari. UPX0675 at -250 (permitting "a non-Google default search service in the web search box of some units of [Safari] but not others (e.g., only in some locations, product lines or versions)").

760. Google rejected Apple's request, and the parties maintained Apple's obligation to use Google as the exclusive default on Safari. Tr. 4998:20–22 (Braddi (Google)) (Apple's requested contract language "dropped out"); JX0009 (Apple ISA (2009 amend.)) (extending the ISA and leaving Apple's default obligation unchanged).

761. In 2012, Apple revived its request to have "[n]o obligation to use Google search services or to make Google the default." UPX0570 at -724. Apple sought this flexibility in its requested terms. Tr. 4998:24–4999:6 (Braddi (Google)). Google again rejected Apple's request for greater flexibility and insisted that Google get the "benefit of the bargain" if Apple wanted to receive revenue share. Tr. 5001:8–11 (Braddi (Google)). Apple acquiesced. JX0024 (Apple ISA (2014 JCA)) (extending the ISA and leaving Apple's default obligation unchanged).

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e) Google's ISA Restricted Apple's Ability To Enter Into A Search Partnership With DuckDuckGo For Safari's Private Browsing Mode

762. Apple considers itself a market leader on privacy. Tr. 2480:3–9 (Cue (Apple)) (Apple "led on privacy across the board" and "thought we could compete" on that basis); Tr. 2484:9–14 (Cue (Apple)) (protecting its users' privacy is "absolutely" important to Apple, including when they conduct searches); UPX0460 at -170 ("Apple's privacy policy overlays all search & knowledge alternatives"). Apple prides itself on offering users superior privacy compared to Google. Tr. 2481:1–8, 2482:8–2483:12 (Cue (Apple)) (Apple believes its approach to privacy is better than Google's); UPX0790 at -677, -681–82 (contrasting Apple's approach to privacy with Google's, including with respect to "Search and Ads"); UPX0279 at -338 ("Every time you go anywhere, click on anything, watch anything, listen to anything, buy anything, search for anything, share anything, etc you are providing both data and programming to [Google's] systems. And we have all read how weak [Google's] moral compass seems to be.").

763. Apple understands that its choice of search engines has privacy implications. Tr. 2477:5–7 (Cue (Apple)). The company has "tak[en] heat from privacy advocates for even having Google as the default search engine in Safari." UPX0094 at -029. And Apple has taken steps to avoid sending certain queries to Google to protect users' privacy. Tr. 2220:6–8 (Giannandrea (Apple)) (agreeing that one of Apple's motivations for crawling and indexing the web is to "protect user privacy when possible"); UPX0494 at -544–45 (resolving queries through Apple's own [redacted] search capability rather than through Google "would be a better privacy angle"). When Microsoft attempted to negotiate for the Safari default, it understood that privacy was "very important" to Apple and that Apple had concerns about Google's privacy practices. UPX1062 at -607–09.

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764. Many popular browsers in the United States offer consumers a private browsing option. Private browsing mode in web browsers, such as Chrome's Incognito or Safari's Private Browsing, only prevents the browser itself from tracking users. Tr. 1952:4–1953:18 (Weinberg (DuckDuckGo)). Private browsing mode does not stop online tracking by websites, or search engines. *Id.* When a consumer conducts a search in private browsing mode on Chrome or Safari, the search engine is still able to collect and store the user's search data. *Id.* 1954:6–1955:4; Tr. 3230:11–3232:19 (Tinter (Microsoft)) ("[W]hile [Apple] phones themselves are very private, the default search experience that [Apple has] created on [its] device is very not private."); UPX0981 at -847 ("We are limited in how strongly we can market Incognito because it's not truly private, thus requiring really fuzzy, hedging language that is almost more damaging.").

765. DuckDuckGo is a privacy-focused search engine. *Supra* ¶¶ 22–23. DuckDuckGo offers users greater privacy by default than other GSEs in the United States. Tr. 1945:1–11 (Weinberg (DuckDuckGo)). For example, DuckDuckGo does not save user IP addresses, user agents, or cookie IDs. UPX0408 at -036 (comparison between DuckDuckGo and Google privacy policies). Accordingly, DuckDuckGo's privacy-centric search engine could provide an important supplement to private browsers. Tr. 1955:5–1956:19 (Weinberg (DuckDuckGo)) (explaining survey data indicating that private-browsing-mode users would also like to use a private search engine).

766. Apple and DuckDuckGo have discussed ways to work together to improve user privacy, including through privacy-centric search. Tr. 2503:2–2505:2 (Cue (Apple)); UPX0631 at -973 (Apple/DuckDuckGo meeting agenda includes [redacted]).

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767. In 2014, DuckDuckGo entered into an agreement with Apple to become a non-default search option in the Safari browser. Tr. 1972:12–1973:11, 2091:5–16 (Weinberg (DuckDuckGo)); DX0946 at -912 (§ 2) (DuckDuckGo-Apple Service Integration Agreement (2014)). In exchange, DuckDuckGo agreed to pay Apple [redacted]% share of the net advertising revenue generated by searches on DuckDuckGo when the user sets DuckDuckGo as his or her search engine in Safari. DX0946 at -915 (§ 8.1) (DuckDuckGo-Apple Service Integration Agreement (2014)); Tr. 2033:4–2034:3 (Weinberg (DuckDuckGo)) (payment applies when user selects DuckDuckGo).

768. At least as early as 2014, DuckDuckGo began pitching Apple on integrating DuckDuckGo's search service into Safari's private browsing mode in some fashion. Tr. 1972:12–1974:5 (Weinberg (DuckDuckGo)). DuckDuckGo proposed implementations in which it would serve as the default search engine in Safari's private browsing mode. *Id.* 2095:14–2096:4 (In 2014, DuckDuckGo asked Apple to "consider making a carve out for private browsing mode where [DuckDuckGo] could be the default."). However, because DuckDuckGo was aware of restrictions on Apple under its contract with Google, DuckDuckGo also proposed alternative implementations. UPX0620 at -364 (2014 DuckDuckGo proposal stating, "[w]e have spoken about Private Browsing previously and are bringing it up again because of the Apple-Google deal coming up for renewal. We're wondering if you would consider including an option to allow the user to switch search engines when entering Private Browsing. If a user were presented with an option to switch to DuckDuckGo for a Private Browsing session, then it would not interfere with the search default.").

769. Executives at Apple expressed interest. Upon hearing news of a change to Google's privacy policy in 2016, Rhonda Stratton (Apple's partner manager for DuckDuckGo)

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lamented, "[w]hat ever happened to do no evil? Met with DuckDuckGo yesterday, they suggested we offer their search engine as part of private browsing and do not track me settings in safari – I think we should do it." UPX1086 at -553; Tr. 1973:12–23 (Weinberg (DuckDuckGo)) (Ms. Stratton was Apple's "partner[] manager" for DuckDuckGo); Des. Tr. 82:7–83:6, 83:9–12 (Apple-EC 30(b)(6) Dep.) (At Apple, Ms. Stratton was the "main person" evaluating GSEs as default options in Safari's drop down menu). In June 2017, Craig Federighi, Apple's Sr. VP and head of engineering, forwarded a pitch from DuckDuckGo "to be the default search engine in Private Browsing," calling it an "[i]nteresting idea." UPX0676 at -571.

770. In October 2017, DuckDuckGo met with Apple executives, including Ms. Stratton, Mr. Federighi, and Mr. Croll, at Apple's headquarters. Tr. 1974:24–1975:16 (Weinberg (DuckDuckGo)). At this meeting, DuckDuckGo presented its research about users' privacy preferences when using Safari's private browsing mode. *Id.* 1975:17–18, 1976:1–1977:11. DuckDuckGo believed the meeting "went very well," and the teams planned to discuss ways they might collaborate on private browsing. *Id.* 1977:13–1978:20.

771. In July 2018, DuckDuckGo met with Apple again and presented options for how Apple could implement DuckDuckGo into Safari's private browsing mode. Tr. 1978:8–1980:15 (Weinberg (DuckDuckGo)). These options included (1) setting DuckDuckGo as the default search service for Safari's private browsing mode, (2) providing users with a "toggle" to turn on "private search" with DuckDuckGo when they used private browsing mode, and (3) displaying a message that includes a link to activate "private search" with DuckDuckGo when users turned on private browsing mode. *Id.* 1978:21–1980:15 (discussing alternatives); UPX0818 at .006–09 (depicting possible implementations). DuckDuckGo presented options (2) and (3), which did not involve setting DuckDuckGo as the default, because DuckDuckGo believed that Apple "wouldn't

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do a default in private browsing mode because of their Google contract," and DuckDuckGo was "trying to get something that would work." *Id.* 1985:5–14.

772. After another meeting in September 2018, DuckDuckGo believed that Apple was considering integrating DuckDuckGo into Safari's private browsing mode in some manner in 2019. *Id.* 1987:15–1988:6 ("We were very excited about this meeting" because Google was "trying to put it in on the roadmap" for 2019 but "hadn't figured out the design yet"); *id.* 1987:15–1988:19, 1989:9–12 (Apple "had identified pretty clearly that the people in the room could not resolve this issue around their Google contract and that the next step was they were going to go figure that out."); *id.* 2031:3–16 (discussing UPX0666 and stating that "the primary obstacle in this . . . was related to Apple's contract with Google about search integrations"); UPX0666 at -735 ("They are considering this for the 2019 release."). DuckDuckGo understood that the "[n]ext steps" were for "Apple to discuss internally on their Google contract, and discuss internally about the various implications of moving away from Google." *Id.* at -735; *id.* at -734 ("They also expressed interest in exploring integrating Private Browsing and need to figure out the Google implications, and haven[']t fully thought through this.").

773. In early 2019, Apple proposed new contract language to DuckDuckGo regarding the revenue share rate that would apply if DuckDuckGo "bec[ame] the default search engine in any Apple Product or in any feature of an Apple Product." UPX1012 at -949. DuckDuckGo interpreted this proposal to mean that Apple was considering DuckDuckGo for the preset default search engine in Safari's private browsing mode. Tr. 2033:4–2035:25, 2037:7–2038:4 (Weinberg (DuckDuckGo)) ("[O]ur understanding was the only place they would be making us the default would be in private browsing mode."). The companies also discussed the revenue share rate that would apply under non-default implementations. UPX1112 at -764 ("Since we're not fully clear

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on what the Private Browsing Integration would look like, we wanted to clarify how rev share would be applied if we were to integrate in a 'list/ballot box' option vs a default in private mode.").

774. Internally, Apple executives continued to consider how various implementations of DuckDuckGo would impact Apple's distribution contract with Google and Apple's relationship with Google more broadly. In February 2019, Apple discussed whether to move forward with an implementation in which "[u]sers who turn on private browsing for the first time will receive a DuckDuckGo recommendation," and "[t]he search engine setting can then be different" for standard browsing mode and private browsing mode. UPX0991 at -335. Apple understood, however, that even this non-default implementation would potentially disrupt the Google relationship. *Id.* at -333–34 ("Before taking our next step, Craig and I would like your take on the effects these [changes] might have on the discussions with Google"; "the implication of recommending DuckDuckGo when customers choose private browsing is that Google does not respect your privacy, which while true would certainly be a public slap in the face."); *id.* at -333 (discussing the "contractual implications" of this implementation).

775. After a phone call with Apple in March 2019, DuckDuckGo believed that, while there was still "concern around their Google contract," Apple may have found a "design [that] would be okay with all parties involved." Tr. 2038:5–2039:22 (Weinberg (DuckDuckGo)). Although DuckDuckGo "never saw the exact design," it understood that Apple would present users with a list of search services that met certain privacy-related criteria and allow users to select the default for private browsing mode from that list. Tr. 2038:5–2040:14 (Weinberg (DuckDuckGo)); UPX0667 at -504–05.

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776. Between October 2017 and March 2019, DuckDuckGo and Apple met approximately 20 times to discuss private browsing integrations. Tr. 2043:17–22 (Weinberg (DuckDuckGo)); *id.* 1973:12–1974:23. DuckDuckGo invested substantial company resources into its engagement with Apple because becoming the default search engine in Safari's private browsing mode, or even being recommended by Apple in an opt-in prompt to users, would have afforded DuckDuckGo "scale" that would allow it to conduct additional experimentation to improve its quality and relevancy. *Id.* 2046:24–2048:8, 2050:4–2051:7. DuckDuckGo would have obtained substantially more queries if it could be the default search engine in Safari's private browsing mode. *Id.* 2047:13–20 (estimating an increase of "probably multiple times" DuckDuckGo's market share at the time).

777. In June 2019, DuckDuckGo expected Apple to announce some form of private search integration in Safari's private browsing mode. *Id.* 2044:4–9, 2044:20–2045:24. Apple did not make any product announcement of this kind and instead shut down discussions with DuckDuckGo about private browsing. *Id.* 2045:25–2046:21 ("[M]y takeaway . . . was that it was dead.").

778. Four years later, in September of 2023, Apple recognized that users may desire a different default search engine for private browsing. The release of iOS 17 allowed users to select a default search engine for Safari's private browsing mode that is different from their default search engine for Safari's standard browsing mode. Tr. 2173:6–20, 2174:11–2175:23 (Giannandrea (Apple)) (referring to UPXD005); Tr. 9917:15–9918:24 (Murphy (Def. Expert)) (indicating that he was unaware Apple had introduced this capability). Pursuant to the ISA, both Safari search defaults are pre-set to Google. Tr. 2173:6–24, 2174:20–2175:3, 2203:20–2204:3 (Giannandrea (Apple)). Apple is not prompting users to change this new default setting and is

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not providing a recommendation that users select DuckDuckGo. Tr. 2174:11–2175:23 (Giannandrea (Apple)) (the switching process for the private browsing mode search default is the same as for the standard browsing mode search default).

B. Google's Android Contracts Are Exclusive

1. MADAs Contribute To Exclusivity

779. MADAs are the only way for OEMs to distribute GMS, including the Play Store, on their Android mobile devices. Tr. 779:10–13 (Kolotouros (Google)) (without a MADA, an Android OEM cannot distribute any GMS apps); Tr. 9516:5–7 (Rosenberg (Google)); UPX0557 at -436–37 (If a certain OEM does not sign a MADA, Google will "send them a cease and desist if they continue to ship with GMS without a contract.").

780. Although MADAs technically give OEMs the option to preinstall GMS on a device-by-device basis, the must-have nature of the Play Store makes this an illusory choice—OEMs need the Play Store to have a viable Android device in the United States, which means OEMs must preinstall GMS and adhere to the MADA's requirements. *Supra* ¶¶ 238–244 (§ III.F.2.a.i); Tr. 781:7–11 (Kolotouros (Google)) (OEMs may elect whether to preinstall GMS on a device-by-device basis); UPX0312 at -154 ("I will say that there is value in the leverage that Play provides to get some of the non-critical GMS apps on a phone. What I mean by that, is that OEMs want the Play store on their phone, and in return we are able to get other apps like Google search and [C]hrome . . . on the phone as a result."); UPX0316 at -906 ("The worst risk to come of [not aligning incentives on the Play store] is that Chinese OEMs and Samsung will no longer need the Play Store for Apps on their phones, which would then weaken the leverage the MADA provides."); *id.* at -907 ("[L]osing Play protections could lead to a material drop in the value of

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MADA (and thus, loss of our potential ability to secure search and other apps)[.]")); UPX0325 at -850 ("If alternative app stores become a viable distribution channel for developers (ie. reach scale), Play revenue would be at risk, and the MADA would come under pressure. This could weaken our ability to secure distribution of the Google search widget on the device (channeling 60%+ of search revenue on Android in the US), as well as the other 1P services we distribute via the MADA and RSA . . . ."); Tr. 3118:22–3121:21 (Tinter (Microsoft)) (When Microsoft launched the Duo, Microsoft "had to have the Google Play Store on it"—there was no viable alternative Android app store—which meant Microsoft had to sign a MADA.); Tr. 3517:6–25 (Nadella (Microsoft)) ("Google has carrots and it has massive sticks, like one big stick is that we'll remove Google Play if you sort of don't have us as the primary browser."); UPX0163 at -236 ("[A] strong Play Store is a prerequisite for the integrity [of] our MADA agreements," which protect Search revenues.); Tr. 5727:5–5728:11 (Whinston (Pls. Expert)) (Google "give[s] away the must-have Play Store for free in order to get the MADA signed." The Play Store is necessary "to have a marketable Android device.").

781. Thus, virtually every Android smartphone in the United States has GMS preinstalled and therefore is subject to Google's MADA requirements when sold to consumers, e.g., Google Search widget on the default home screen, GSA preinstalled, and Chrome (defaulting to Google search) preinstalled. Tr. 791:25–792:2 (Kolotouros (Google)) (has not seen any Android OEM smartphone in the United States that does not have GMS preinstalled); *id.* 815:16–816:1 (is not aware of any Android-compatible Samsung or Motorola devices without the Google Search widget on the default home screen); Tr. 1527:5–9 (Yoo (Google)) (nearly all Android phones sold in the U.S. are subject to both a MADA and an RSA).

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782. Through the MADA, Google imposes search preinstallation, placement, and default requirements on all Android devices with GMS sold to U.S. consumers. *Supra* ¶¶ 235–252 (§ III.F.2.a).

783. MADAs ensure that valuable home screen space is devoted to Google services (e.g., Search Widget, Play, and Google folder). Des. Tr. 98:1–3, 98:6–10 (E. Christensen (Motorola) Dep.) (Apps on the home screen are potentially easier for users to find.); Des. Tr. 59:18–24 (Ezell (AT&T) Dep.) (the home screen is valuable real estate for apps because it is the first screen users see); UPX0141 at -819 (MADA requires the Google Search Widget, the Play Store, and the Google folder ("[c]ollection of apps") on the default home screen).

784. Google does not allow OEMs to deviate from the most important MADA obligations, e.g., placing the Google Search widget on the default home screen, or preinstalling Chrome. UPX0608 at -769 ("[W]e never deviate from MADA obligations and Chrome distribution via GMS. No exceptions."); UPX0318 at -199 (Google's position during a Samsung RSA renewal negotiation was that the "widget on home screen [requirement] stays in MADA (of course. this is non-negotiable. but Samsung will push harder than ever on it)."); UPX0554 at -915 ("[W]e should preemptively let Verizon and OEM's [*sic*] know that if they endeavor to snap the MADA by pivoting search away, we will reject the request."); UPX0555 at -931 ("[T]the 'ask' of the OEM is a reminder or notification that if Verizon comes to them (the OEM) and tells them to ditch the Google search widget and replace it [with] the Bing/AOL search box, the request to not adhere to MADA placement obligations will be denied."); Des. Tr. 149:2–4, 149:8–10 (Christensen (Motorola) Dep.) (Although Motorola has not requested an exception to the MADA's preinstallation requirements, the witness did not believe Google would grant such a request if it was made.).

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785. The Google Search widget is a manifestation of Google search, *supra* ¶¶ 153, 155; Tr. 791:3–7, 794:3–9 (Kolotouros (Google)) (explaining that the Google Search widget is part of GSA and that it is a search box users can enter questions in), and "Chrome exists to serve Google search." UPX1031 at -512.

786. The risk of violating the MADA—and losing the Play Store—protects Google's exclusivity. T-Mobile had concerns that if it switched search defaults from Google, its devices would not be able to distribute the Google Play Store. Des. Tr. 112:19–113:2, 113:4–16 (Giard (T-Mobile) Dep.). T-Mobile discussed its concerns with Google, but Google would not give T-Mobile a direct answer. Des. Tr. 113:17–115:19, 115:21–116:2 (Giard (T-Mobile) Dep.). T-Mobile has never gotten an answer from Google on whether a device could be GMS-certified if its search provider was not Google. Des. Tr. 116:4–8, 116:10–12 (Giard (T-Mobile) Dep.).

787. The placement requirements for Google's Search widget and Play Store are non-negotiable for all OEMs. Tr. 793:24–794:2 (Kolotouros (Google)) (discussing UPX0741 at -799); *id.* 815:9–22 ("We had, without exception, not granted waivers with respect to the widget or the Play Store, that is correct."); UPX0741 at -799 ("[L]et me state it more stringently. The widget and Play Store icon are staying.").

788. Google refused to grant the Duo, Microsoft's dual-screen Android smartphone, a waiver from the MADA's requirement that the Google Search widget be preloaded on the home screen. Tr. 9505:20–25 (Rosenberg (Google)). Microsoft, of course, wanted the Duo's search access points to default to Bing, but to get the Play Store, Microsoft had to sign a MADA and had to put the Google Search widget on the Duo's homescreen. Tr. 3119:02–3121:2, 3121:25–3122:25, 3125:16–22 (Tinter (Microsoft)).

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789. Although the MADA does not prohibit OEMs from preinstalling a second search widget, Google knows that OEMs are unlikely to do so, at least in part, because it would be a poor user experience. Tr. 1527:24–1528:20 (Yoo (Google)) (discussing UPX0141 at -819 and explaining that a second widget is described as "[a]llowed but not likely" because "OEMs want to sell devices, they want to be competitive[] [a]nd we thought that having two widgets was a little too much, so that OEMs are not likely to put two widgets on a device"); UPX0131 at -250 (2017 deck stating "[a]dditional search widget allowed but unlikely" (emphasis omitted)).

790. Microsoft did not place the Bing search widget on the Duo's homescreen next to Google's Search widget because, in part, having two search widgets "would be really confusing" and "wouldn't be a good product for the user." Tr. 3126:3–10 (Tinter (Microsoft)).

791. There are no Android smartphones sold in the United States with more than one search widget preinstalled on the default home screen. Tr. 2877:2–2877:7 (Kartasheva (Google)) (agreeing that she has never seen an Android device with two search widgets); Tr. 803:17–20 (Kolotouros (Google)) (not aware of any Samsung or Motorola smartphone sold in the United States at any time that had more than one search widget preinstalled); Tr. 1528:12–20 (Yoo (Google)) (discussing UPX0141 at -819 and stating that he is not aware of any Android smartphone sold in the United States that has two widgets side-by-side on the default home screen). Even when Google agreed to MADA amendments that allow Samsung to remove the Google folder from the default home screen, Google continued to require that the Google Search Widget and Play Store are placed on the default home screen. Tr. 807:22–808:3, 813:2–25, 815:9–22 (Kolotouros (Google)).

792. Samsung's MADA requires the company to preinstall Chrome. JX0037 at -053 (§ 1.9 defining "Core Applications" to include Chrome), -055 (§ 2.1 requiring Samsung to

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"preload each device with all Core Applications") (Samsung MADA (2017)). Samsung also preinstalls S Browser, its first-party browser, on Android devices. Tr. 858:7–12, 939:12–16 (Kolotouros (Google)). Search rivals like Microsoft believed that Samsung was "not willing to ship three browsers on [Android] device[s]." UPX0133 at -811. Accordingly, Microsoft believed that the MADA made it impossible for Microsoft to get the Edge browser with Bing preinstalled on Samsung Android devices. *Id.* at -811 ("Given [Samsung is] contractually obligated to ship Chrome, shipping Edge would require replacing the Samsung browser. They are not willing to take this dependency now."); UPX0301 at -646 ("[Samsung is] required to include Chrome on device. This is consistent with our MADA obligations and the standard MADA that G[oogle] has OEMs sign so reasonable to assume Samsung customer MADA has the obligation. Therefore to take Edge they would either need to ship 3 browsers on the device (Samsung browser, Edge, and Chrome) or drop Samsung Browser. 3 browsers is DOA [dead on arrival]. They don't want that high of an app load (they are still trying to reduce total number of pre-installs) and actually told me they are getting pressure from carriers to drop the number of browser to 1. . . They worry a lot about damaging the Google relationship and how much leverage they have.").

793. The MADA access points—GSA/widget and Chrome—account for most of the search queries and search revenue generated by Android devices. Tr. 16:19–17:3 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (emphasizing the leverage to secure GSA and Chrome because those were Google's highest revenue-generating apps and therefore very important in the context of a finance organization); UPX0146 at -388 (for the major U.S. carriers (AT&T, Verizon, T-Mobile, and Sprint) 67–75% of search revenue comes through GSA and 19–32% of search revenue comes through Chrome); UPX0660 at -369 ([redacted]% of the search revenue from Android devices with Samsung Client IDs (i.e., governed by Samsung's RSA) flowed through

[redacted]

Chrome and GSA, "i.e., access points [Google gets] via MADA"); UPX1105 at -208 (2018 native spreadsheet at Summary tab, columns I, M, Q, U; the vast majority of search revenue and queries for each Android partner came through MADA access points); UPX0563 at -135 (native spreadsheet at Summary tab, columns E-G, K-M; indicating that between 2014 and 2016 the vast majority of search revenue and queries for each Android partner came through MADA access points).

794. At various times, Google has estimated that ~75–90% of search revenue on Android devices comes through GSA and Chrome. UPX0146 at -388 (for AT&T, Verizon, T-Mobile, and Sprint, Chrome and GSA account for between 85% and 99% of search revenue); UPX0567 at -918 ("Today [approximately March 2017], ~90% of Search revenue for current partners and markets where we will be offering revenue share, is generated by GSA and Chrome, where Google is set as default per MADA[.]"); UPX1108 at -924 ("MADA access points (GSA and Chrome) contribute vast majority of search revenue on Samsung devices"; estimating [redacted]% of search revenue on Samsung comes from Chrome and GSA).

795. In recent years, GSA "became a very prominent destination for users to search on an Android device." Tr. 19:3–20:14 (Sept. 19, 2023 sealed PM session) (Yoo (Google)); UPX1107 at -732 ("In the US, GSA has grown to dominate as a dist[ribution] search access point, representing nearly [redacted]% of search revenue through the [redacted]." (emphasis omitted)); Tr. 23:4–17 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (approximately [redacted] of revenue on Verizon Android devices and even more on other carrier Android devices came through GSA, including the search widget).

796. The Google Search Widget alone accounts for 50% or more of search revenue from Android devices. UPX0316 at -906 ("Without MADA, we would not be able to incentivize

[redacted]

placement of the Widget, which drives ~50% of search revenue on a device and secures other 1P apps like Chrome and Assistant."); UPX0150 at -900 (Google Search Widget accounts for an estimated 60% of search revenue on Android devices); Tr. 10187:21–10188:3 (Murphy (Def. Expert)) (agreeing that expert's own slide shows Google's Search Widget has overtaken browsers in terms of search volume). As Google acknowledges, the MADA secures this revenue. UPX0131 at -250 (2017 deck stating that MADA "secure[s]" 60% of search revenue).

797. It is possible for users to delete the Google widget or Chrome browser and install an alternative; however, few users do so due to the power of defaults. *Infra* ¶¶ 868–874 (§ VI.D.1).

2. RSAs Contribute To Exclusivity

798. Search default exclusivity with Android partners has long been the "primary goal" of Google's RSA. Tr. 332:12–334:1 (Barton (Google)) (obtaining the exclusive search default is RSA's "primary goal"). As explained by Christopher Barton, a former Google employee who negotiated the early RSAs with Android partners during his time at Google (2004–2011), exclusivity for search defaults was a "standard part" of Google's revenue share requirements. Tr. 312:25–313:12, 325:9–24 (Barton (Google)) (testifying about "always" dealing for default exclusivity in exchange for revenue share).

799. Google's "philosophy" is to pay revenue share in return for search default exclusivity. Tr. 346:16–24 (Barton (Google)) (reviewing UPX0134 at -869); UPX0134 at -865 ("We need to incentivize carriers to ship Google by using the same approach we at Google have used for many years: 'We will pay you revenue share in return for exclusive default placement.' This contract is an exchange. . . Without exclusivity, we are not 'getting' anything."). As Arjan Dijk, who worked at Google for more than a decade before joining Booking.com, explained: "[I]t was clearly understood [at Google] that being the default is almost everything, because

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when you're the default 95 percent of people will stick with the default. Maybe 5 percent of people will opt out. And that kind of realization was very clear." Tr. 5282:25–5283:4, 5283:11–24 (Dijk (Booking.com)); *id.* 5329:21–5330:6 ("I [ran] a growth marketing team, together with behavioral scientists, that we would look at, you know, the power of defaults and what we could do to really make sure that Google would be preferred.").

800. Google views "[a]ny deal which invests in devices that do not have Google Search as default (where available) is a waste of time and money." UPX0088 at -356.

801. For distributors to maximize RSA payments, Google requires that the distributors set Google as the default on *all* search access points and prohibits distributors from preinstalling any general search rival. *Supra* ¶¶ 253, 259.

802. Through the RSAs, Google gets "[o]ut-of-the-box search defaults and exclusivity," which prevents rivals from accessing default distribution on Android devices covered by RSAs. UPX0129 at -906; Tr. 837:5–25 (Kolotouros (Google)) (In the RSA's device-by-device tier, OEM RSAs require Google to be set as the default on all search access points and "out of the box exclusivity with respect to pre-loading."); Des. Tr. 79:10–13, 80:7–81:3, 81:5–8, 81:11–13 (Levine (Google) Dep.) (The main value of the carrier RSAs was revenue in exchange for the carrier assuring that "Google Search . . . was the only search product promoted by the carrier out of the box."); UPX0317 at -176 (Google gets "Device exclusivity + Defaults" from the RSA with "Top Carriers and OEMs."); UPX0574 at -945 (having "Mobile Rev Share Partners" with OEMs like Samsung means "[a]ll devices have search exclusivity (for pre-install and default search)"); *id.* at -952 ("A[n] [redacted]% OEM rev share can be offered to gain search & output-based exclusivity, along with expanded default settings with strategic partners[.]");

[redacted]

UPX0580 at -945 (The "[r]ationale in support of the [Samsung RSA] proposal" includes "Google as default search/exclusive search.")).

803. RSAs allow Google to protect search access points not covered by the MADA, such as secondary browsers (i.e., browsers other than Chrome). All the major RSAs require the partner to set Google as the default on all browsers if the partner wants to maximize revenue share percentage. *Supra* ¶¶ 253–309 (§ III.F.2.b). Securing the defaults on secondary browsers on Android devices is important to Google. In a 2019 exchange regarding the Samsung RSA, Mr. Kolotouros and Mr. Yoo analyzed the implications if they viewed all of Google's payments to Samsung under its RSA as being made in exchange for the default on Samsung's S Browser. UPX0165 at -226. They found that Google's payments to Samsung [redacted]. *Id.* ("For a while now, we have been [redacted]."). *Id.*

804. The exclusive defaults secured through Google's MADAs and RSAs cover roughly 19.4 percent of all general search queries in the United States. Tr. 5763:14–22 (Whinston (Pls. Expert)) (explaining UPXD104 at 36, which attributes 19.4% share to Android).

805. Android partners have pushed back on the RSAs' exclusivity terms for many years. UPX1026 at -080 (Verizon removed the search exclusivity term from a term sheet during negotiations with Google in 2018.); UPX0558 at -045 ("Samsung pushed back strongly on proposed terms for revenue share agreements," including asking for "no exclusivity requirements."); UPX0321 at -015 ("T-Mobile asking for a) higher rev share percentage, b) no restrictions on other Assistants/ no exclusivities or defaults, and c) no new security requirements."); *infra* ¶¶ 822–831 (§ VI.B.4).

[redacted]

806. In 2008, Google was negotiating an early RSA with Sprint. In an email discussing Sprint's edits to the draft terms, Mr. Barton identified as a "key issue" the threat of removal of exclusive default commitments, noting that without these commitments, Sprint could give rival GSEs the "same level of prominence" as Google. UPX0544 at -628 ("Sprint appears to have removed commitments that Google will be the ONLY default search wherever it is placed. In other words, they could put Yahoo [and] MSN at the same level of prominence (despite the fact that we are paying out revenue share)."); UPX0288 at -765–68 (2008 Google-proposed term sheet with exclusive default search terms); UPX1081 at -066–70 (Sprint deleted exclusive default search terms from Google's proposed term sheet).

807. Sprint's attempt to remove the exclusive default commitments was a "key issue" for Google because being the exclusive default was the RSA's "primary goal." Tr. 333:20–334:1 (Barton (Google)). Ultimately, the 2008 Sprint RSA included default exclusivity. UPX5533 at -124–25 (Sprint RSA (2008)) (§ 5) ("Default Exclusivity" terms); UPX1080 at -183 (It was "a good thing [Google] negotiated hard since [Sprint] kept changing their story on where search was.").

808. Google monitors OEMs and carriers to ensure they comply with the RSA prohibitions, including that partners do not make it too easy for users to change their search defaults. For example, in 2018, some Samsung devices allowed users to easily change the S Browser's search default by selecting from a drop-down menu. UPX0149 at -003. Google notified Samsung that this easy-to-change default violated Samsung's RSA; Google told Samsung that devices with this feature were not eligible for revenue share. *Id.* at .001. Complying with Google's demand, Samsung changed the functionality on its Android devices to ensure a simple drop-down menu would not change the S Browser's search default. Tr. 856:2–

[redacted]

858:4 (Kolotouros (Google)); *id.* 885:19–888:2 (The RSA prohibited Samsung from permitting its users to change the default using the drop-down menu.); UPX0853 at -652 ("We also need to make sure that by January 31st, they OTA an update so that it does not make the drop-down search default selection permanent.").

809. Similarly, when LG wanted to incorporate Naver, a South Korean GSE, on its Android devices, Google enforced the RSA's exclusivity and prevented this. UPX0308 at -852–53 (2011 emails stating that Google would not pay revenue share if LG gave users a choice between "Google mode" (which would set Google as the default search engine) and "LG mode" (which would set Naver as the default search engine)); UPX0135 at -670–71 (2010 email thread stating that Samsung would remove Naver from an Android tablet it planned to manufacture for a South Korean carrier because having Naver on the device would violate Samsung's RSA with Google and cost the OEM revenue share on that tablet).

810. By obtaining default exclusivity on Android devices, Google excludes rivals from accessing an important search distribution channel. Tr. 899:6–900:1 (Kolotouros (Google)) (discussing UPX0569 and explaining that Google wanted Motorola to enroll as many devices in the RSA's Premier Tier as possible); UPX0569 at -691 ("[C]ritical to the Moto/Lenovo deal is knowing that we are buttoned up so that high-value devices/countries cannot be carved-off and we don't lose tablet volume as well."); Tr. 340:24–341:21 (Barton (Google)) (discussing UPX0134 and explaining that Google sought exclusivity for Android devices because otherwise Google "would have created an ecosystem that basically would just lead to a bunch of searches on competing services"); *id.* 324:11–21 (Google asked for exclusivity because "[it] wanted to be the partner that [carriers and OEMs] would select as opposed to our key search competitors with regards to being the default search exclusive partner."); UPX1077 at -001, -004 ("Microsoft and

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Amazon pursuing distribution deals on devices not covered by RSA," e.g., "Bing is a default search on Xiaomi & Vivo in India").

811. Google has long recognized that its RSAs excluded competitors from gaining a foothold on Android devices and it has sought to use its RSAs for that purpose. Tr. 324:11–21 (Barton (Google)). As one Google document put it, "[r]ev shares protect [the] Golden Goose (Google.com on Android)." UPX0541 at .005.

812. In 2011, Mr. Barton recognized that "Android is by far the greatest opportunity for Search monetization in mobile over the next years and is very strategic to Google." UPX0134 at -865; Tr. 339:4–340:19 (Barton (Google)) (discussing UPX0134 and explaining that Android combined with other Google products "would create an opportunity that would be orders of magnitude, lead some orders of magnitude, more searches, and more search ad monetization per device, more than predecessor devices").

813. Mr. Barton told his colleagues that Google seeks to make RSAs "exclusive across all Android devices," so that Android devices "will come with Google as the only search engine out-of-the-box." UPX0134 at -869. He explained the importance and purpose of exclusivity: "Without the exclusivity, we are not 'getting' anything. Without an exclusive search deal, a large carrier can and will ship alternatives to Google (as seen with Verizon, AT&T, and America Movil)." *Id.* at -865. He further explained: "[Without exclusivity,] Bing or Yahoo Can come and steal away our Android search distribution at any time, thus removing the value of entering into contracts with them. Our philosophy is that we are paying revenue share *in return for* exclusivity." *Id.* at -869.

814. In 2020, when Google was negotiating new RSAs with U.S. carriers, Jamie Rosenberg, then VP of Business and Operations for Android, posited that if Google lowered the

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revenue share paid to carriers, then rivals might be able to obtain distribution on Android phones by outbidding Google. UPX0150 at -900; Tr. 2859:5–8 (Kartasheva (Google)) (discussing UPX0150).

815. Anna Kartasheva, who supported the Android business development teams and worked on restructuring the RSAs, reassured Mr. Rosenberg that lowering the revenue share would not put Google at risk of losing the search exclusivity it achieves with the MADAs and RSAs. UPX0150 at -900. Ms. Kartasheva explained that search exclusivity is well protected because "MADA protects the [Search] widget on the device (60% of the revenue)" and the "Samsung RSA ensures Chrome is in hotseat/set as default browser on carrier devices as well (30% of the revenue)," leaving only 10% of search revenue that "would be not protected on carrier devices in the absence of [carrier] RSA[s]." UPX0150 at -900 (emphasis omitted). She further stated, "This leaves, in the pretty generous case, only about 10% of the search revenue of [an Android] device to any rival who wants to buy [Google] out." *Id*.

816. Ms. Kartasheva further explained that she believed a rival "would have to give up at the minimum, 150% of their monetization" to outbid Google for the remaining search access points still available after a carrier deal. UPX0150 at -900 (emphasis omitted).

817. At trial, Ms. Kartasheva sought to recant the analysis in her 2020 email to her boss. However, Ms. Kartasheva conceded that even correcting for the alleged errors in her analysis, a rival search provider could bid for only 20% of the search revenue on an Android device. Tr. 2869:25–2870:6 (Kartasheva (Google)) (discussing UPX0150 and how the percentages in the numbered listed at the top of -900 might change if she corrected for alleged errors). Moreover, she acknowledged that figures similar to those that she reported in her 2020 analysis appeared in other contemporaneous Google documents and admitted that she believed

[redacted]

her analysis to be accurate at the time she sent it to her boss. Tr. 2865:15–23 (analysis accurate) (Kartasheva (Google)); *id.* 2874:14–17, 2875:5–2876:17 (similar contemporaneous figures in UPX0131 at -250); UPX0131 at -250 (MADA "secure[s]" 60% of search revenue).

3. MADAs And RSAs Are A Belt-And-Suspenders Strategy To Exclude Rivals From Accessing Search Distribution

818. MADAs and RSAs work together as a belt-and-suspenders strategy for excluding search rivals from distribution on Android devices. UPX0573 at -244 (The "incremental benefits" of offering revenue share to carriers "over MADAs with OEMs" are to "take a much needed belt and suspenders approach to our Search and Play contracts to include both OEM's and carriers. . . While the MADA is essential to set the foundation with OEM's, the carriers could potentially overrule the OEM placement by placing considerable pressure on said OEM's, leveraging the fact that those carriers are buying the OEM devices, after all."); UPX0645 at -303 (Adding the RSAs, on top of the MADAs, "provides a way to safeguard search defaults."); UPX0158 at -115 ("[W]e secure distribution through three mechanisms. MADA ensures access, RSA optimises access points, and Aftermaket complements the two." And the RSA is an "[i]nsurance policy that preserves our search and assistant usage."); Tr. 321:18–322:1 (Barton (Google)) (Google negotiated search distribution contracts with both carriers and OEMs because sometimes the carrier decides whether Google search goes onto a mobile device, and sometimes the OEM decides.).

819. Google's economic expert Prof. Murphy agreed that (1) Google buys protections on Android devices through a combination of the MADA and RSA, and (2) OEMs and carriers both consider the agreements that the other has with Google when entering into its own agreements. Tr. 10173:12–10175:11 (Murphy (Def. Expert)) (Google buys protections on Android devices "in two chunks"—"some through the MADA" and "the rest through the

[redacted]

RSA."); *id.* 10175:14–19 (conceding expectation that when Google sets the RSA percentage for carriers, it considers the prior agreement and what they've already got in the MADA); *id.* 10184:25–10185:19 (OEMs consider the add-on net benefits of signing the RSA when they consider signing the MADA.).

820. When carriers decide whether to sign an RSA with Google, they do so against the backdrop of the OEM's MADA, which ensures that GSA and Chrome will be on the device regardless of what the carrier decides. Tr. 1516:24–1517:10 (Yoo (Google)) (discussing UPX0141 and agreeing that although carriers do not sign MADAs, the devices sold by carriers are subject to the MADAs of the OEMs that manufactured them); UPX0326 at -850 (Without an RSA in place, only non-MADA access points on Android are available to rivals.).

821. In the case of Android devices sold by U.S. carriers, no one party (carrier or OEM) can unilaterally decide to move away from Google search defaults, i.e., "if a carrier decided it wanted to just completely ditch Google, it can't because the OEM has agreed to a MADA." Tr. 5714:15–5715:17 (Whinston (Pls. Expert)). Similarly, if the OEM wanted to replace Google, it can't because the carrier has agreed to an RSA. Tr. 5714:15–5715:17 (Whinston (Pls. Expert)).

4. Google's Agreements Prevented Verizon From Preinstalling The Yahoo Search App On Its Android Devices

822. During negotiations leading up to Verizon's 2021 RSA, Google refused Verizon's request to preinstall the Yahoo search app and still qualify for the top (Preferred) RSA tier. *Supra* ¶ 276; UPX0495 at -003–04 (Google dropped the revenue share to only [redacted]% if Yahoo general search was preinstalled, which Verizon executives described as "punitive."); Tr. 1065:2–6 (Higgins (Verizon)); 1075:14–21 (Higgins (Verizon)) (Google refused to provide a carveout in

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the 2021 RSA that covered Yahoo's general search functionality with no impact to the revenue share.). Verizon bought Yahoo in June 2017. Tr. 1043:14–18 (Higgins (Verizon)).

823. In Verizon's 2014 RSA, the prohibition on preinstalling alternative search services had been inadvertently removed from the executed agreement. Tr. 9356:3–14, 9356:24–9357:12 (McCallister (Google)); UPX2093 at -398 ("[I]n previous amendments . . . the exclusivity provision was removed (!!) so we are paying Verizon [redacted]% for basically nothing right now. . . [T]he highest priority is re-securing exclusivity.").

824. During RSA negotiations in 2018 and 2019, Verizon "argu[ed] vigorously" to keep the contract non-exclusive. UPX0642 at -198; UPX1026 at -080 (Verizon removed the search exclusivity term from a term sheet during negotiations with Google in 2018). Google refused. Under the 2021 RSA, Verizon earns [redacted]% revenue share if Google has search exclusivity (the Preferred Tier), but only earns [redacted]% revenue share if it preinstalls an alternative search service (the Core Tier). *Supra* ¶¶ 276, 278.

825. Verizon secured a limited carveout in the Preferred Tier that allowed Verizon to preinstall the Yahoo Mobile App with web search functionality as long as Verizon owned Yahoo, placed the app on the plus one screen or device app tray (not the home screen), and made sure the app "didn't allow a punch-out into general search." Tr. 1094:19–1095:15 (Higgins (Verizon)); JX0093 at -500 (§ 5.2(a)(i)) (Verizon RSA (2021)); UPX0293 at -425 (Google's rationale for allowing Verizon to preinstall the Yahoo home app on the plus one screen included that "[s]earch usage [was] not expected to be materially impacted as long as Google retain[ed] placement on DHS [default home screen].").

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826. Google noted the benefits of giving Verizon a patina of control by "[r]elaxing configuration requirements to allow preloads of alternative Search apps helps ease regulatory risk and reinforces Google's principle to provide options to users." UPX0293 at -425.

827. In a 2019 analysis, during RSA negotiations with Google, Verizon looked at the cost of preinstalling the Yahoo Search, assuming Verizon would earn [redacted]% revenue share from Google if Verizon gave Google exclusivity but only [redacted]% revenue share if Yahoo Search was preinstalled. UPX0304 at -606; UPX0290 at -608. Verizon concluded it would cost Verizon over $[redacted] to preinstall Yahoo. *Id.* (The value of "agree[ing] to Google's exclusivity terms" and only preinstalling Google Search was $[redacted] (assuming [redacted]% revenue share), while the value of preinstalling Yahoo Search and earning only [redacted]% revenue share was only $[redacted]). From a strictly financial perspective, including Yahoo Search did not make sense under the agreement. *Id.*

828. Because the difference between the two tiers was so large, Verizon viewed the [redacted]% revenue share as a "punitive" response to Verizon preinstalling the Yahoo Search on its Android devices. UPX0495 at -003; Tr. 1065:2–13 (Higgins (Verizon)) (Google's insistence on dropping the revenue share to [redacted]% if Yahoo general search was preinstalled was punitive "because of the size of the reduction," which "seemed large."); UPX0305 at -781 ("Google is . . . creating new obligations on Verizon that would inappropriately influence decisions we need to make with our business.").

829. Verizon viewed not being able to set Yahoo as the default search service on Chrome as a significant revenue disadvantage. UPX1130 at -531 ("If we can't displace Googe search in chrome, then I don't think we have much – a separate browser with yahoo search will not be able to replace the revenue in Chrome.").

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830. Verizon never preloaded Yahoo Search on any of its devices and ultimately sold Yahoo in May 2021, a month before the 2021 RSA was executed. Tr. 1056:16–18 (Higgins (Verizon)); *id.* 1072:11–13; JX0093 at -514 (Verizon RSA (2021)) (RSA executed June 2021).

831. In addition to Verizon's ownership of Yahoo, another reason Verizon sought flexibility in the RSA is because the technology space changes rapidly and Verizon wanted to make sure it was not limiting the capabilities or innovations it could offer to its customers. Tr. 1080:7–14 (Higgins (Verizon)).

5. Google's Agreements Prevented Branch From Distributing Its App-Search Program On Android Phones

832. Since 2014, Branch's primary mission has been developing an app-search tool for easily identifying and surfacing app content in response to a query. Tr. 2893:18–2895:6 (Austin (Branch)). Google's exclusivity agreements prevented Branch from having its app-search tool preinstalled on Android devices without restrictions on its functionality.

833. For several years, Branch sought to partner with OEMs and carriers to distribute Branch's app-search tool as a preloaded feature on smartphones. *Id.* 2914:7–2915:10 (Branch chose to partner with OEMs to have its app-search tool preloaded rather than made available as a standalone app available through the Play Store because "[i]t's very challenging to get anybody to actually go out of their way and use some sort of alternative app or even download a new app."); PSX00952 (summarizing Branch discussions and meetings with Samsung and U.S. carriers about preloading Branch's app-search tool). Branch explored distributing its app-search tool through search bars on Android devices but understood that OEMs and carriers had existing agreements with Google on those search access points. Tr. 2897:16–2899:13 (Austin (Branch)) ("[P]retty universally the feedback we would get from prominent, popular search bars was, we have a relationship with Google. We receive large sums of money. And, you know, unless you

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can compensate for that, we're not going to use you. And there's all sorts of restrictions about how the placement would work, et cetera.").

834. Branch settled on having its app-search tool run on a search bar within an Android feature called the "app drawer" or "app tray." Tr. 2896:24–2899:13 (Austin (Branch)). On Android, the app drawer provides users quick access to all installed apps. *Id.* The app drawer has a built-in search bar to filter apps. *Id.* For instance, using the existing functionality, a user could search for "pizza" and see a list of every app on the user's phone with "pizza" in its name. *Id.* 2900:13–2901:8 (explaining DX0612 at .018 and describing user experience without Branch integration).

835. When powered by Branch, that same search for "pizza" would showcase app content. For instance, when a user searched "pizza" in the Branch-powered search bar, the user might see results from restaurant review sites like Yelp, food delivery services like DoorDash and UberEats, travel sites like TripAdvisor, and other apps with content matching the "pizza" query. *Id.* (explaining DX0612 at .018); DX0612 at .018 (showing example integration of Branch's technology into the app tray). Clicking on the link would take the user directly into relevant pages within the app (known as a deep link). Tr. 2902:5–14 (Austin (Branch)).

836. Branch's first and most promising OEM relationship was with Samsung. *Id.* 2914:7–2915:10. Samsung invested in Branch in 2015; for years Samsung and Branch met to discuss how the app-search tool could be integrated onto Samsung phones. *Id.* 2907:8–21, 2907:25–2908:4. In 2018, talks between Branch and Samsung executives intensified as the companies worked to launch the tool in March 2019, on Samsung's flagship device, the Galaxy S10. *Id.* 2907:8–21, 2907:25–2908:4.

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837. In the months before the S10's release, Samsung grew concerned that distributing Branch's app-search tool, without changes to its functionality, might conflict with Samsung's search distribution agreements with Google. *Id.* 2905:1–19, 2908:6–13, 2919:8–21 (describing Samsung's concerns and UPX1064 as representative of Branch's communications with Samsung) ; UPX1064 at -543 (Nov. 2018 email from Junghan Kang (Samsung) to Branch employees explaining, "the gating factor here is the Google-Samsung contract terms and anything that can be claimed by Google as 'web search' is something we need to avoid'"); UPX0687 at -078 (2020 chat message from Patrick Chang, asking rhetorically, "Why would [Samsung] turn down a billion a year today with Google for dozens of millions with branch?").

838. To avoid conflict with the Google agreement, Samsung requested Branch reduce or eliminate functionality on its app-search tool. Tr. 2905:1–19 (Austin (Branch)). Those restrictions drastically limited the usefulness of Branch's tool and Branch's ability to monetize it. *Id.* 2911:12–2912:11; Tr. 4497:20–23, 4498:23–4499:4 (Chang (Samsung Next)) (Branch's full functionality was not integrated on the S10); UPX0658 at -586 ("OEMs/Carriers are afraid of Google's influence[.] . . . [Samsung has] [p]laced significant restrictions on Branch functionality (only installed apps, no linking to web)"). For example, although Branch had indexed thousands of apps, Samsung directed Branch to hide results from all but 20 or 25 pre-determined apps; Samsung manually checked each approved app to ensure it was not sending users to websites. Tr. 2910:16–2911:11 (Austin (Branch)); UPX1038 at -753–54 (listing 20 to 25 pre-determined apps permitted by Samsung on S10 launch). As a result, users did not see results from new and popular apps if they were not included in those Samsung pre-selected. Tr. 2954:3–14 (Austin (Branch)).

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839. Also, Branch's app-search tool was not permitted to direct users to websites. *Id.* 2908:15–2909:2. Although Branch's default experience was to send users to app pages, companies or users could configure their search results to go to a mobile website instead of an app page if the user had not installed the app. *Id.* 2909:16–2010:14. For some users, this was preferable to being directed to the Play Store to download an app before using it. *Id.*; Tr. 4499:5–15 (Chang (Samsung Next)) (Branch, as implemented through the S-Finder, was limited to a "select number of applications").

840. Samsung recognized that directing Branch to curb the functionality of its app-search tool adversely impacted the user experience but felt those curbs were necessary due to Samsung's RSA terms. UPX1064 at -543 ("[Y]es, I do realize [Branch with certain functionality] is [a] much better experience . . . . However, the gating factor here is the Google-Samsung contract terms and anything that can be claimed by Google as 'web search' is something we need to avoid."); UPX0690 at -427 (Aug. 2020 chat between Patrick Chang (Samsung) and David Eun (Samsung) bemoaning Samsung's eventual decision to walk away from Branch partnership stating, "They aren't thinking about longer term strategy and insuring that we have some functionality outside of Google, in addition to optimizing the user experience").

841. In response to Samsung's concerns, Branch developed a feature called "Deepview" to work around Google's restrictions. Tr. 2915:25–2916:20, 2918:2–11 (Austin (Branch)) (discussing the "Deepview" feature). But again, Samsung raised concerns about violating its RSA; Junghan Kang, Samsung's product manager for the Branch-Samsung integration, informed Branch that "the gating factor" to integrating a feature onto S10 devices was "the Google-Samsung contract terms" and "[a]nything that can be claimed by Google as

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'web search' is something [Samsung] need[ed] to avoid." UPX1064 at -543; Tr. 2921:2–16, 2921:21–2922:9 (Austin (Branch)) (discussing UPX1064).

842. Like Samsung, other OEMs and U.S. carriers expressed concern that Branch's app-search tool (even with limited functionality) would violate Google's distribution agreements. Tr. 2922:12–25, 2926:16–2928:12 (Austin (Branch)) (describing discussions with OEMs related to concerns over Google RSAs); UPX0656 at -451 (2020 email exchange between AT&T and Branch employees discussing AT&T's concerns about Branch's app-search tool infringing on Google's RSA requirements); Des. Tr. 278:18–279:3 (Christensen (Motorola) Dep.) (If Motorola were to load Branch's app-search tool onto its Verizon devices, its devices may fall out of compliance with the RSA's premier tier requirements); UPX0692 at -4000 (Samsung email discussing push-back from carriers to Branch's launch on Samsung devices).

843. Branch spoke to every major Android OEM and U.S. carrier but repeatedly heard that RSAs required Google to be the only GSE preloaded on their devices. Tr. 2926:14–2928:12 (Austin (Branch)); *id.* 2932:5–9 (Branch "talked to every OEM," after Samsung about integrating its app-search tool.); Des. Tr. 139:21–140:4 (Giard (T-Mobile) Dep.) (T-Mobile was interested in Branch because of its potential to "further improv[e] the customer experience on devices" and "develop[e] a new revenue stream"); Tr. 1112:15–21 (Higgins (Verizon)) (Verizon discussed with Branch "ways in which we could potentially improve the device experience" by incorporating Branch technology onto Verizon's Android devices); UPX0967 at -778 (email from Comcast executive to Gary Wolfson at Branch, stating Branch's app-search tool "would create conflict with [Comcast's] rev share from Google").

844. Branch was not able to reach a deal with any OEM to distribute the "broad app search" functionality that Branch envisioned could "help a user find information across apps."

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Tr. 2932:10–19 (Austin (Branch)). Branch was only able to distribute its local search version, with greatly restricted functionality and monetization, because partners deemed this lower functionality compatible with Google's RSAs. *Id.* 2932:10–19 (discussing OEM outreach generally); *id.* 2933:4–24 (Branch's deal with Xiaomi permitted Branch's service to be preloaded on devices that were more than a year old. This still "limited [Branch's] ability to monetize greatly, "because usually a device a year old is a lot less valuable from an advertising perspective than a fresh device.").

845. Similarly, Branch was not able to reach a deal with U.S. carriers to distribute tools with the broad app-search functionality, even though the U.S. carriers saw value in Branch's product. Tr. 2934:6–13 (Austin (Branch)); Des. Tr. 238:9–239:7, 247:1–3 (Ezell (AT&T) Dep.) (before walking away, AT&T discussed "expand[ing] and monetize[ing] Branch's service already available on Samsung devices); Des. Tr. 139:21–140:4 (Giard (T-Mobile) Dep.) (discussing T-Mobile's interested in Branch's technology).

846. Again, Branch understood from carriers that concerns over violating Google RSA terms was a significant roadblock. Tr. 2935:14–20 (Austin (Branch)).

847. Branch spoke repeatedly with AT&T executives who expressed concerns that distributing Branch's app-search tool would violate AT&T's RSA. Tr. 2936:1–4 (Austin (Branch)) ("We spend a lot of time talking with AT&T."); UPX0656 at -451 (AT&T asking Branch executive to confirm that Branch's app-search tool would not infringe on Google's search requirements). Branch was never able to move AT&T past those concerns. Tr. 2940:10–2941:9 (Austin (Branch)) (discussing AT&T's concerns as expressed in UPX0656); Des. Tr. 247:1–3 (Ezell (AT&T) Dep.) (confirming that ultimately, AT&T did not pursue a partnership with Branch).

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848. Although Branch eventually reached distribution deals with Verizon and T-Mobile, those deals only distributed Branch's app-search tool with reduced functionality. Tr. 2942:14–2943:23 (Austin (Branch)).

849. Google's RSAs blocked distribution of Branch's tools, and Google sought to prevent distribution of Branch's app-search tool, even with its reduced functionality. *Infra* ¶¶ 850–858. By Spring 2020, Branch and AT&T's discussions regarding a potential distribution partnership had advanced substantially. As Jeffrey Ezell, Vice President of business development for AT&T's mobility business unit, explained, AT&T believed there was ambiguity regarding whether Branch's app-search tool would be considered a competitive search service under the RSA. Des. Tr. 239:8–9, 239:11–240:5 (Ezell (AT&T) Dep.). AT&T tried to ascertain if Branch's app-search tool was supplemental to or overlapping with general web search; if Google considered Branch's app-search tool a competing or alternative search service, AT&T could be in breach of its RSA and lose search revenue from Google. *Id.* 239:8–9, 239:11–240:5, 242:22–243:18; UPX0656 at -451 (AT&T seeking assurances from Branch that preloading its products would not violate AT&T's Google Search requirements).

850. In May 2020, after several months of discussions with Branch, AT&T's Eli Trowbridge emailed Kesh Patel, AT&T's relationship manager at Google, to ask whether distributing devices with a Branch-powered S-Finder was consistent with the RSA. UPX0982 at -695. Mr. Patel immediately sought additional information about the Branch service, including how the service worked on Samsung phones. *Id.* at -693–95. Mr. Patel passed the information to his colleagues, including Ms. Kartasheva. Tr. 2790:25–2791:12 (Kartasheva (Google)) (discussing UPX0664 and explaining that her colleagues had relayed a question from AT&T about whether distributing a Branch-powered S-Finder was consistent with the RSA).

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851. Upon learning of Branch's integration into Samsung's S Finder, Ms. Kartasheva ran on-device searches using the Galaxy S10's S Finder which, at the time, was powered by Branch's app-search tool. Tr. 2801:11–2802:2, 2802:15–17 (Kartasheva (Google)). She compared search results on S Finder when the device was connected to the internet with search results when the phone was on airplane mode and determined that, even with the limitations Samsung placed on Branch's app-search tool, the search results were more robust when the service was connected to the internet. *Id.* 2801:11–2802:2, 2803:2–2804:12. Ms. Kartasheva concluded that Branch technology conflicted with Google's definition of the Alternative Search in AT&T's RSA because Branch conducted off-device searches that returned results across multiple apps. *Id.* 2802:3–2804:12; UPX0664 at -453–54 ("We have discovered that Samsung Finder in its current implementation (incorporating Branch io API) does appear to conduct off-device (web) search across multiple apps, which conflicts with our definition of the Alternative Search . . . .").

852. Led by Ms. Kartasheva, Google sought to prevent OEMs and carriers from distributing Branch's app-search tool. UPX0664 at -453–54. After meeting with Google colleagues, Ms. Kartasheva shared a set of next steps for the business development teams. *Id.* at -453–54. First, they would confirm that other major U.S. carriers had language in their RSAs, like AT&T's, that would allow Google to ask them to discontinue their distribution of Branch's app-search tool. *Id.* at -454. Second, they would determine (1) if Samsung had enabled Branch's app-search tool on Samsung devices globally, and (2) whether Samsung doing so was a breach of its RSA. *Id.* Finally, Mr. Patel would contact AT&T "specifically to get this resolved" by telling Mr. Trowbridge that Branch's app-search tool, as implemented, was not permitted on AT&T devices that qualified for a revenue share. *Id.*; UPX0982 at -686–87.

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853. Google employees carried out Ms. Kartasheva's plan, "pushing back" on OEM and carrier deals with Branch. UPX0694 at -599–600 ("We believe [the S Finder implementation with Branch's technology] goes beyond the scope of what we originally allowed Samsung (and US carriers) and have started pushing back on them . . . ."); UPX0982 at -686–87.

854. Mr. Patel responded to AT&T's inquiry about Branch, saying that "search results that pull from 'Internet content' in a manner substantially similar to Google" constitute an alternative search service. UPX0982 at -686–87. AT&T understood Google's position that preinstalling Branch's app-search tool on AT&T's devices, using an internet connection as intended, would be violating AT&T's RSA. Tr. 340:1–341:6 (Ezell (AT&T) Dep.) ("[T]he way it was reported back to me was that Google indicated they felt that it was inconsistent with the RSA.").

855. After deciding that Branch's functionality was a threat to Google, Ms. Kartasheva reached out to others at Google, including Adrienne McCallister, then the Managing Director of Global Partnerships, to organize outreach to Samsung and the other U.S. carriers concerning S Finder and Branch technology. UPX0664 at -454; UPX1067 at -799–801.

856. Ms. Kartasheva created and circulated a PowerPoint presentation that explained the Branch "situation," stating that "Samsung's partnership with Branch expands the search experience via deep linking, violating their contracts." UPX0694 at -202; Tr. 2886:3–2887:2 (Kartasheva (Google)).

857. Ms. Kartasheva sought to placate partners dissatisfied by Google's rejection of Branch. On June 10, 2020, Ms. Kartasheva reached out to a colleague on the Search product team asking if "Google Search [could] do something similar to this" so Google could "pivot the

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conversation with Samsung and carriers from asking them to take it down, to seeing if Google could power this experience." UPX0694 at -599–600.

858. Ms. Kartasheva also took steps to ensure that subsequent Samsung RSAs clearly prohibited Samsung from preinstalling Branch's app-search tool. On a draft RSA term sheet being prepared by Google's Samsung Business Development team, Ms. Kartasheva commented, "[P]er discussion today on Branch, should we clarify that app search implementation that they have in Samsung Finder is not allowed?" UPX0609 at -629. Google's Business Development team took Ms. Kartasheva's comment to heart. Days later, Google sent Samsung a draft RSA term sheet expressly foreclosing Branch's services: "S Finder (or its successor) and other services which provide on-device search (settings, contacts, etc.) functionality shall not return any results which require a connection to the internet." UPX2003 at -990, -992; UPX0654 at -795, -798 (email from Christopher Li (Google) to Mr. Kolotouros (Google) discussing language added into the newest RSA iteration preventing preinstallation of Branch functionality that uses an internet connection to return search results). To Samsung, Google's position suggested that it was afraid that Samsung would use Branch to create a product that would "cannibalize Google's main business" and Google wanted to "kill all of Branch's attempts" to preinstall its app-search tool on Android devices. UPX0690 ("Google is afraid of Samsung creating an Apple Spotlight type of search, Vertical Search will cannibalize Google's main business").

859. Branch tried to salvage its distribution deal with Samsung by, among other things, developing a completely offline version of its search product. This version lacked core functionality and was a degraded user experience, but only periodically required a connection to the internet. Tr. 2927:2–2930:6 (Austin (Branch)) (describing development of offline search and

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its further limitations on the functionality of its app-search tool); PSX00075 at -000; UPX0689 at -271–73 (Branch presentation describing offline search).

860. Google's actions successfully dissuaded AT&T and Samsung from working with Branch. After Google indicated to AT&T that preinstalling Branch's app-search tool was inconsistent with the RSA, AT&T chose not to pursue a partnership with Branch because it did not believe that the economic upside from Branch was significant enough to justify the risk to Google revenue share. Tr. 242:22–244:9, 340:1–341:6 (Ezell (AT&T) Dep.) (explaining Google's opinion of Branch's app-search tool, as communicated back to him, and the decision to walk away); *id.* 247:1–249:12 ("It didn't appear that the economic upside from Branch was significant enough to, you know, potentially put at risk a device not being eligible for our Google Search revenue.").

861. Similarly, Google's 2020 Samsung RSA included terms that effectively blocked Branch from increasing the functionality of its app-search tool on Samsung devices. JX0071 at -394 (§ 1.5) (Samsung RSA (2020)) (defining "Alternative Search Service" as "any web or on-device search service (including on-device search that incorporates multiple vertical search functionalities) that offers functionality that is similar to Google Search"). Samsung understood these terms to substantially constrain its ability to distribute Branch's tools, let alone increase the functionality of Branch's original vision of an app-search tool. UPX0663 at -469 ("The current agreement is looking like google will own all search on device. . . . This will completely kill all potential for any branch search and other future services."). Based on conversations with Samsung, Branch held a similar understanding. Tr. 3069:21–3072:6 (Austin (Branch)) (explaining conversations with Samsung employee and feedback Branch received about Samsung's decision making).

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862. Samsung ultimately terminated discussions with Branch about an expanded partnership. Branch's understanding, informed by communications it had with Samsung executives, was that Samsung did not move forward with "Offline Search" because of its Google agreement. Tr. 2930:17–2931:11 (Austin (Branch)).

C. Google's Browser Contracts Are Exclusive

863. Google has default search agreements with Firefox and Opera, as well as other smaller browsers. *Supra* ¶¶ 310–318 (§ III.F.3).

864. The exclusive defaults secured by Google's RSAs with third-party browsers cover roughly 2.3% of all U.S. general search queries. Tr. 5763:14–22 (Whinston (Pls. Expert)) (discussing UPXD104 at 36).

865. Google's exclusive default position on browsers has excluded rivals from search shares they could get absent Google's contracts. For example, Google has projected that a rival GSE would receive a significant share of the queries on third-party browsers if the rival won the default. *Infra* ¶¶ 914–926.

866. Similar to its conversations with Apple, *supra* ¶¶ 762–778 (§ VI.A.2.e), DuckDuckGo has pitched private browsing mode integration with browsers but has been unsuccessful; these browsers' contracts with Google were "the common theme." Tr. 2048:9–2050:1 (Weinberg (DuckDuckGo)) (listing Samsung's S Browser, Mozilla's Firefox browser, and Opera's browser); UPX0787 (DuckDuckGo pitching private browsing mode to Mozilla).

D. Defaults Have A Powerful Effect On Users' Search Behavior, Particularly On Mobile Devices

867. Defaults are powerful in virtually all contexts. Tr. 526:22–25 (Rangel (Pls. Expert)) (discussing consensus in the field of behavioral economics about default effects). Search is no different. In search, this is demonstrated by the massive sums Google pays each

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year to ensure it maintains its search defaults status. *Infra* ¶¶ 932–943 (§ VI.D.6). In fact, Google spends more money securing exclusive defaults than on all other search-related expenses combined. Tr. 7576:9–7577:6 (Raghavan (Google)) (discussing UPX7002.A at 1). Many general-search queries are controlled by the power of defaults, and that is especially true on mobile devices.

1. The "Power Of Defaults"

868. A default is an option pre-selected for a consumer by a third-party, such as a smartphone manufacturer, that requires an affirmative action by a consumer to change. Tr. 520:7–25 (Rangel (Pls. Expert)) (defining defaults from the perspective of behavioral economics); Tr. 154:3–7 (Varian (Google)) (describing a default as a "capability that's available before the user takes any action"). A default search engine is the search engine that comes pre-selected on a search access point when a user first begins using the access point. Des. Tr. 68:19–25 (Ramalingam (Yahoo) Dep.) (the default is the one set "[w]ithout any user input"); Tr. 322:19–323:4 (Barton (Google)) (the default search is "the one that comes out of the box" on a browser, desktop, or mobile phone).

869. Across a range of domains, defaults have a powerful impact on consumer decisions. Tr. 520: 7–25, 526:22–529:16 (Rangel (Pls. Expert)) (discussing impact of defaults on consumer decision-making and various real-world default biases including coffee-shop tipping, 401(k) plans, and organ donation).

870. In its own businesses, Google has long understood and embraced the "power of defaults," a term first evangelized by Dr. Varian in 2007. UPX1001 at -465 (referencing Dr. Varian's "'power of defaults' idea"). As one Google employee explained, "the default options presented (in anything from finance to gaming) are very powerful, and will probably end

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up being what most people choose (out of lack of knowledge about customization, or convenience)." UPX0081 at -438.

871. In 2018, Google's internal behavioral economics[15] team used the power of defaults to manipulate ad spending by creating a $10 default for advertisers' maximum daily budget. Tr. 532:22–535:12 (Rangel (Pls. Expert)) (discussing UPX0101 at -285–86). Despite being visible to advertisers and easy to change, the new default budget had a powerful impact on Google's advertisers as 64% of "low-budget" spenders (advertisers who previously set their daily maximum to less than $10 per day) increased their daily budget. *Id.* 532:22–535:12 (discussing UPX0101 at -285–86). However, Google also found the default "too powerful" because it dragged down spending by advertisers who had been setting their daily maximums above $10. *Id*.

872. Google also recognizes the power of the few defaults that it does not own but instead calls these the "tyranny of default." UPX0111 at -825 (June 20, 2017 memo on "Google Branding on Search Desktop"); UPX0099 at -390 (Dec. 12, 2016 Email from Ben Friedenson (Google) analyzing Microsoft Edge default settings and observing either a) 'tyranny of the default' or b) a surprisingly high preference for/loyalty to Bing" among Edge users). In 2005, Google complained to Microsoft about its decision to preset a default search engine in the

[15] Behavioral economics is a branch of economics that applies concepts from psychology and neuroscience to improve understanding of human decision-making—including decisions made by consumers. Tr. 516:3–8 (Rangel (Pls. Expert)); UPX0101 at -280 ("Behavioral Science: A method of predictive analysis that applies economic modeling and psychological insight to the study of how people make decisions and develop attitudes and beliefs."). For almost a decade, Google has relied on collaboration with Irrational Labs, a behavioral economics consulting firm, and its own internal behavioral science team led by Maya Shankar, the former head of behavioral economics in President Barack Obama's administration. Tr. 531:22–532:17 (Rangel (Pls. Expert)); *e.g.*, UPX1102 (2015 Irrational Lab presentation to Google); UPX0103 (2021 presentation from Google's internal Behavioral Economics team).

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Internet Explorer browser. Tr. 7677:5–7681:6 (Pichai (Google)) (contextualizing UPX0172). Google wrote, "As you know, most end users do not change defaults," and only "a tiny fraction of end users . . . try to change the default." UPX0172 at -731; *supra* ¶ 742. Google accused Microsoft of "put[ting] its own interests above those of end users." UPX0172 at -731. Because users do not change defaults, Google was "deeply concerned" that Microsoft's decision to preset its own search engine as the default in Internet Explorer could harm the competitive process. Tr. 7693:5–8 (Pichai (Google)) (confirming concerns written in UPX0172).

873. Google proposed that Microsoft implement, instead of a preset default, a choice screen that would allow the end user to select their default engine the first time he or she used the Internet Explorer search box. UPX0172 at -731. A choice screen would place "control in the hands of the end user, where it belongs." *Id*. Giving the user choice of search engine and a straightforward means of changing it was "indispensable both to preserve competition on the merits in search and to avoid distortion of competition in related markets." *Id.* at -732; Tr. 7685:9–15, 7686:1–6 (Pichai (Google)) (Google proposed a choice screen to benefit users by aligning with user preference).

874. Other industry participants recognize the power of defaults on consumer behavior as well. Considering a request from Google that Apple share more user-location data, Apple executives said having "data sharing" set to "off" by default "wouldn't have any real effect since so few people change defaults." UPX0094 at -029. Apple recently demonstrated the power of defaults in a public way; the company changed from a default to a choice screen for cross-app tracking on iPhones, which resulted in 80% of users forbidding cross-app tracking even though they had previously acceded to tracking by default. Tr. 635:15–637:8 (Rangel (Pls. Expert)) (discussing UPXD101 at 55).

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2. Search Engine Defaults Are The Most Efficient Method Of Distribution

875. Defaults can generate a bias in favor of the default option even when the default is easy to change, when the stakes of the decision are high, such as with end-of-life care, and when the person making the decision is an expert, such as in medication prescriptions. Tr. 529:17–531:21, 532:18–535:12 (Rangel (Pls. Expert)).

876. By comparison, using a GSE is a low-stakes and low-expertise activity, so default bias is especially strong. *Id.* 530:10–531:21, 532:18–535:12. Default effects in search are "sizeable and robust." *Id.* 523:14–24, 541:2–22; Tr. 5749:17–5750:22 (Whinston (Pls. Expert)) ("[T]he power of defaults is very significant."). Even Google's expert, Prof. Murphy, agreed that empirical evidence suggests that having a default generates "additional search volume." Tr. 9941:9–11 (Murphy (Def. Expert)).

877. Dr. Ramaswamy testified that "being the default on the browser is the most efficient way to get [a search engine] into the hands of your users" because of the "convenience of easy accessibility and" tapping into . . . engrained default behaviors are deciding factors when it comes to whether a search engine gets lots of usage." Tr. 3689:15–24 (Ramaswamy (Neeva)); Tr. 1961:20–1962:5 (Weinberg (DuckDuckGo)) (being a search access point's default search engine is the most successful method of distributing a search engine).

878. In a 2007 study, Google examined the effect of browser home page defaults and query share. UPX0123; UPX0093 at -904. In the study, Google found that, when considering the factors that might influence a user's choice of search engines—such as results quality, search features, user experience, and brand strength—"one factor surprisingly trumps them all: the default home page setting." UPX0093 at -904 (Abstract for 2007 Google study "On the Strategic Value of the Default Home Page to Google"); UPX0124 at -036 (Aug. 10, 2007 presentation for Mr. Pichai (Google) and Ms. Braddi (Google) showing the "strong relationship between home

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page and search share"). Google further found that defaults were "directly correlated" with query share. UPX0093 at -904. Google showed that "users who have home page set to Google do 50% more searches on Google compared to those who don't." UPX0093 at -904. At the time, Dr. Varian concluded that the study was "great stuff" and "a very convincing case." UPX1001 at -465.

879. Dr. Varian also agreed with (and liked) the study's conclusion that a default home page—a form of default distribution popular at the time—"can be a powerful strategic weapon in the Search battle." Tr. 170:15–24 (Varian (Google)) (reviewing UPX0123 at -485); UPX0123 at -487; UPX2049 (Executive Management Group (EMG) representatives "agreed that [it] is important" to "focus[] on homepage market share" because it is "one of the most effective things we can do to make gains in search market share"). In response to the study's findings, Google began "taking these defaults very, very seriously." Tr. 3710:15–3712:20, 3714:12–20 (Ramaswamy (Neeva)) (discussing UPX0093); UPX0093 at -904 (email from Dr. Ramaswamy, while working at Google: "This study is very cool! We should definitely put some marketing push behind it").

880. In contrast to defaults, app downloads and marketing are ineffective methods of distribution; the availability of search apps in mobile application stores—such as the Play Store or Apple's App Store—do not erode the effectiveness of default distribution. Tr. 617:23–618:17 (Rangel (Pls. Expert)). A Google survey found that more than a third of iPhone users did not know that they could download the Google Search App and that the majority of those who were aware of the ability to install the app still did not see the need to depart from Safari. UPX0139 at -149. Mozilla has found it "exceedingly difficult" to convince mobile users to download its browser application because "people have to find and install and you have to struggle if you can

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make them your default." Des. Tr. 135:3–5, 135:8–22 (Baker (Mozilla) Dep.). "[M]erely having an app in the app store is a very difficult way to compete with the preloaded defaults . . . [b]ecause each person who gets that phone has to make a conscious decision to go through a lot of work to get to your product." *Id.* 139:20–23, 140:1–24. Apple also views searching on an application, such as the Google Seach App, as inferior to searching on a browser and that a search app therefore "wasn't the best thing for customers." Tr. 2493:18–2495:23, 2496:6–10 (Cue (Apple)). Google's analysis about search on Apple devices has similarly found that more than half of iPhone users did not have the Google Search App installed and even about half of the users who did still preferred using Safari. UPX0139 at -150.

881. Paid marketing for GSEs, browsers, and search apps is also an ineffective distribution method. UPX0122 at -960 (illustrating various distribution methods for Google services and calling pre-installation the "highest value way to acquire users"). In 2016, Emily Moxley, a Google vice president, "guarantee[d]" that marketing Google Search in Windows 10 would "make no difference" in generating usage. PSX00216 at -126 ("Didn't work for safari, won't work here!"). A January 2015 Google "Post-Mortem" on Firefox's 2014 default switch to Yahoo found that marketing efforts were immaterial. UPX0145 at -441, -450 ("Early results indicate that Chrome/DSE/DHP promos have little/no effect."); UPX0169 at -180 (email to Sundar Pichai (Google) stating "user promos [on Firefox] haven't materially returned users to Google"). DuckDuckGo has found marketing to be unhelpful in generating traffic because teaching people to change the default search engines is difficult. Tr. 1957:15–1958:5 (Weinberg (DuckDuckGo)).

882. Ultimately, a default search engine garners "enormous usage simply by the power of the default." Tr. 3710:7–3712:20 (Ramaswamy (Neeva)) ("[W]hoever controls that search box

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gets a lot of usage independent of the merits of the search engine. And so you get enormous usage simply by the power of the default."). According to Microsoft CEO Satya Nadella: "The entire notion that users have choice and they go from one website to one website or one search into one search and it's complete bogus. There's defaults. The only thing that matter in terms of changing search behavior." Tr. 3497:13–3498:4 (Nadella (Microsoft)). "Whoever owns [the] default will gain share no matter what the quality." Tr. 2722:2–10 (Parakhin (Microsoft)) ("It is, I believe well-documented fact that people very rarely switch defaults.").

883. Indeed, most search traffic arrives through defaults rather than through non-default querying. UPX0083 at -967 (61% of Google's queries in 2017 arrived at Google via a paid distribution deal, which was a steady increase from 48% in 2014, 52% in 2015, and 57% in 2016.); UPX1050 at -894 (65% of Google's Apple Traffic arrives through "Safari Default Search" compared to just 13% through "Safari Organic Homepage"); Tr. 23:25–25:2 (Sept. 19, 2023 sealed PM session (Yoo (Google)) (Android "organic" queries have declined over time.); *id.* 25:16–27:3 (less than 10% of Android revenue comes from "organic" queries); Tr. 3102:11–3104:25 (Tinter (Microsoft)) (discussing greater use of search defaults than non-default querying); UPX0080 at -509 (Email from Ms. Braddi (Google) stating that Google generated almost three times as much revenue on iOS from default traffic as "organic" revenue).

3. Behavioral Economics Explains The Power Of Defaults

884. The behavioral economics concepts of habit, choice friction, and user confusion and awareness explain the preeminence of default distribution. Tr. 541:2–22, 542:25–543:18, 547:16–549:3 (Rangel (Pls. Expert)).

a) Habit

885. Habit is when consumers make decisions automatically based on prior outcomes rather than expending cognitive capacity to make an explicit choice. Tr. 541:23–542:24 (Rangel

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(Pls. Expert)) (consumers use habit to preserve limited cognitive capacity by, for example, requesting the same order at a coffee shop rather than considering every possible option on each visit). Because search is an activity carried out repetitively, on a familiar interface, and with immediate feedback in the form of a search result, search "[h]abits develop very strongly." *Id.* 542:25–543:9.

886. Google's users have identified "habit"—along with convenience and ease of access—as the reason why they continue to use the "Google Safari Default." UPX0090 at -940–41 (2010 Google iPhone user study respondent: "I use Google out of habit. There is no difference between the way the results are presented from other engines.").

887. Google itself recognizes the impact of habit on consumer behavior in search. To address the threat of competition from Microsoft's search product in 2003, Dr. Varian recommended that Google "[g]et users addicted to our interface and tools." UPX0151 at -158–59; Tr. 140:22–142:9, 144:13–19 (Varian (Google)) (discussing context of UPX0151); Tr. 545:12–546:8 (Rangel (Pls. Expert)) (discussing UPX0151 at -158–59 as reflecting what behavioral economists would consider "an extreme habit"). The 2007 Google study examining the effect of browser home page defaults and query share, *supra* ¶ 878, attributed increased searching when Google was the default homepage to the fact that "[u]sers do not always make a deliberate choice of search engine." UPX0123 at -485 ("Most users stay with pre-configured home page settings"); Tr. 551:10–552:13 (Rangel (Pls. Expert)) (habit is the opposite of a consumers' deliberate choice). And Google pursued default exclusivity in its search distribution contracts precisely because it afforded Google "an opportunity to be discovered and used on a repeating basis." Tr. 338:13–17 (Barton (Google)).

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888. Mr. Nadella explained that the Google search habit has become ingrained like many other common habits; he testified, "[Y]ou get up in the morning, you brush your teeth and you search on Google. And so therefore, with that such level of habit forming, the only way to change is by changing defaults." Tr. 3497:13–3498:4 (Nadella (Microsoft)). Dr. Ramaswamy similarly asserted that "the convenience of easy accessibility and tapping into . . . engrained behaviors are the deciding factors when it comes to whether a search engine gets a lot of usage. . . . [D]efaults become habits." Tr. 3689:15–3690:4 (Ramaswamy (Neeva)).

889. Habit is so profound in search that generative AI is unlikely to meaningfully impact Google's search usage share. Tr. 3512:8–3513:9 (Nadella (Microsoft)) (Generative AI "doesn't address all the other challenges . . . which is the user habit [that] comes from search defaults, settings, so the distribution advantage Google has today doesn't go away."). Dr. Raghavan agreed that ChatGPT "hasn't put a dent in Google's market share." Tr. 7533:6–7534:19 (Raghavan (Google)).

890. As a result of controlling the defaults on search access points, habit creates bias in Google's favor. Tr. 541:23–542:24 (Rangel (Pls. Expert)).

b) Choice Friction

891. On the infrequent occasions when a consumer makes an explicit choice of search engine, choice friction causes Google's default to remain sticky. Tr. 541:2–22 (Rangel (Pls. Expert)) (changing only the choice architecture for implementing a consumer's decision, such as the number of steps to execute the decision or the difficulty of executing those steps, can powerfully affect consumer decision-making); *id.* 551:10–552:13 (in search, users act in "explicit or deliberative" decision-making mode only "infrequently"). Increasing choice friction increases the stickiness of a particular default. *Id.* 554:4–21 ("[T]he more choice friction it takes to change the defaults, the stickier the defaults are.").

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892. Google's internal behavioral economics team has taught the company that even "[s]eemingly small friction points in user experiences can have a dramatically disproportionate effect" on consumers' decisions. UPX0103 at -214; UPX0848 at -612 ("each barrier in terms of time attention, and demand for thinking is 10X what you think it is"). A June 2019 presentation about private searching on Google, prepared for Google's product counsel, observed that Google was failing to "fully address user needs" because "multiple toggles and settings to get into a more 'private state' outside of Incognito . . . create user friction and are difficult to understand." UPX0811 at -413.

893. In search, Dr. Rangel found that bias towards Google's defaults arises from at least four sources of choice friction faced by users changing the pre-set default search engine. *First*, a user must become aware that there is a default search engine and that it can be changed. Tr. 552:15–553:25 (Rangel (Pls. Expert)); Tr. 2636:3–9 (Cue (Apple)) (before changing the default search engine on an iPhone, a user must know that a search engine is pre-selected as the default). *Second*, the user must discover what alternative options to the default search engine exist. Tr. 552:15–553:25 (Rangel (Pls. Expert)). *Third*, the consumer must learn the steps necessary to change the default. *Id.*; Tr. 2636:10–2637:8 (Cue (Apple)) (an iPhone user must understand how to change the default search engine on iPhone, which may require going to Apple, Google, or Bing's support websites to learn the steps). *Fourth*, the consumer must actually take the steps necessary to implement the change. Tr. 552:15–553:25 (Rangel (Pls. Expert)).

894. On Apple's iPhone, the steps to change the default search engine require overcoming "substantial" choice friction. Tr. 562:21–563:8 (Rangel (Pls. Expert)); Tr. 2169:23–2170:20 (Giannandrea (Apple)) (reviewing the four steps to change the default search engine on

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iPhone in UPXD004); Tr. 2630:7–16 (Cue (Apple)) (describing four steps to change the default search engine on iPhone); Des. Tr. 55:20–56:14 (Ribas (Microsoft) Dep.) ("even though, in theory, it's possible to [change the Safari default on iPhones], it's not" and even "some [Microsoft] corporate vice presidents" and "smart engineers" have asked how to make a change).

895. An Android user who has already overcome the choice frictions of understanding that there is a default, discovering the alternatives, and learning the steps to change the Google default search widget must still execute ten steps to implement the change, which constitutes "considerable choice friction" for the user. Tr. 559:14–562:20 (Rangel (Pls. Expert)) (reviewing UPXD101 at 21–38); Tr. 979:19–980:2 (Kolotouros (Google)) (explaining that DX0738 at 2–3 shows that replacing a search widget requires one swipe, two touch-and-holds, three taps, and a selection); Tr. 2722:11–13 (Parakhin (Microsoft)) (requiring multiple clicks to change a search engine default makes doing so proportionally more difficult).

896. It also takes several clicks to change the default search engine on Mozilla's Firefox browser. Des. Tr. 187:18–20, 187:23 (Baker (Mozilla) Dep.). Changing the default search engine in other browsers is often even more difficult. *Id.* 49:16–23 (competing browsers' preset default search engines are "often not nearly as easy to change the default as in Firefox"); Tr. 1958:15–1961:8 (Weinberg (DuckDuckGo)) (Getting people to switch defaults is difficult because "it's all just way harder than it needs to be.").

897. Consequently, changing the default search engine requires "mental effort" and is not a "zero cost" action. Tr. 563:9–25 (Rangel (Pls. Expert)); Tr. 3491:23–3493:8 (Nadella (Microsoft)) ("changing of defaults is hard"); Tr. 3796:5–3798:22 (Ramaswamy (Neeva)) (dismissing the "pious prose around 'competition being a click away'"). In contrast, controlling defaults boosts Google by making it "very, very seamless and easy for users" to access Google.

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Tr. 7661:1–11 (Pichai (Google)) ("[W]e know [making Google the default on Safari] would lead to increased usage of our products and services, particularly Google Search in this case. So there's clear value in that, and that's what we're looking to do."); Tr. 1537:9–12 (Roszak (Google)) (a benefit of Google's default distribution deals is reducing choice friction).

898. Google has long recognized and even harnessed the effect of choice friction to protect its defaults. Tr. 554:17–558:19 (Rangel (Pls. Expert)) (discussing representative examples of Google recognizing and harnessing choice friction). For as long as the company has required it, Google's default exclusivity has ensured that a user cannot change the default search engine to a rival without going into the device's settings. Tr. 324:14–325:11 (Barton (Google)). This makes changing default search engines "difficult." *Id.* 338:18–24 (explaining that users would "have a difficult time finding or changing [the default search engine] to Google" were it not pre-set as the default search engine).

899. Google's MADAs with OEMs ingrain the importance of choice friction. Tr. 556:12–557:9 (Rangel (Pls. Expert)). In January 2020, Google amended the MADA to restrict OEMs from making it easier for a user to change a default by prohibiting OEMs from including "processes, instructions, promotions, or other means that directs, instructs or encourages the End User to change" their default search engine away from Google. *Id.*; UPX5358 at -004 (§ 2.5) (LG MADA (2020 amend.); JX0099 at -998 (§ 2.9) (Motorola MADA (2020 amend.)); UPX5511 at -987–88 (§ 2.9) (Samsung MADA (2020 amend.)); Tr. 799:14–801:21 (Kolotouros (Google)) (agreeing that MADA's amendments prohibited OEMs from instructing or encouraging a user to change default settings or placements).

900. Google's new prohibition against instructing or even encouraging a user to make changes introduced choice friction by impairing users' awareness of the ability to change a

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default. Tr. 556:12–557:9 (Rangel (Pls. Expert)) (analyzing new prohibitions in the context of a Samsung MADA amendment).

901. Google has insisted on more default search friction, even when the partner preferred less. In 2018, Samsung changed the interface in its S Browser to add a drop-down menu in the address bar that would allow a consumer to easily and permanently change their default search engine. *Supra* ¶¶ 296, 808; Tr. 856:2–857:17 (Kolotouros (Google)) (Samsung's S Browser included a dropdown in the address bar that permanently changed the S Browser default search engine). Google informed Samsung that this change breached the RSA and considered terminating Samsung's RSA. *Id.* 857:14–858:1; Tr. 557:11–558:18 (Rangel (Pls. Expert)); UPX0149 at -.001–.003; UPX1011 at -289 (Google considered terminating Samsung's RSA due to a potential fourth strike). Samsung acceded to Google's demands and threats, and users who might wish to change the search default must take additional steps to do so. Tr. 887:1–6, 887:24–888:13,890:3–9 (Kolotouros (Google)).

c) User Confusion And Unawareness

902. Default bias in favor of Google is bolstered further by user confusion and unawareness about what a default search engine is or even that it can be changed. Tr. 547:16–549:3 (Rangel (Pls. Expert)) ("[M]any [users] are confused. They don't know that there is a default. They don't know what the default search engine is. They don't know they can be changed."); *id.* 552:15–553:25 ("[M]any people are not aware [that there is a default search engine], and people are confused, even about what's the default search engine that they have.").

903. Many internet users do not pay attention to their search engine and instead simply use the default search engine in their browser. Tr. 3685:15–3686:19 (Ramaswamy (Neeva)) (testifying about UPX0940 at -492, which found that almost half of surveyed users search using the "Browser's default" GSE). For example, one 2020 Google study found that more than 80%

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of Google's daily active users on Apple's iOS access Google through Apple's pre-set default browser, Safari, and were "often unaware they're using Google." UPX2051 at -519–20 (user unawareness of Google use in Safari "a risk for [Google]"). Google's expert Prof. Murphy agreed that some users are probably unaware that they even have alternatives for their default search engine. Tr. 9942:7–10 (Murphy (Def. Expert)).

904. Often, even tech-savvy consumers do not know the difference between a browser and a search engine. Tr. 3685:15–3686:19 (Ramaswamy (Neeva)) (user feedback revealed that "many perfectly tech-savvy people could not tell the difference between a browser and a search engine"); Tr. 702:5–23 (Rangel (Pls. Expert)) (users "don't understand the difference between searching and browser"). Google interviewed Microsoft users in 2017 and found they were confused about the difference between browsers, search engines, and even email. UPX0066 at -073 (recording feedback from one Bing user who said, "Most of the time I use Google, everybody knows that"); PSX00216 at -126 ("one fundamental issue [with marketing Google in Windows 10] is that users on Edge don't even realize they aren't using Google, and they don't feel they are missing out").

4. Market Evidence Confirms Default Effects In Search

905. Because defaults "have a strong impact" with a "75% take rate," in 2007, Google leadership rejected Apple's request to amend the ISA to allow Apple to implement a search engine choice screen in Apple's forthcoming version of the Safari browser for Windows. UPX0137 at -688–89; Tr. 7691:19–7692:13 (Pichai (Google)); Tr. 4980:13–4983:8 (Braddi (Google)) (describing meeting). In 2010, Google found that it "will lose more than 50% of Google users (and more non-Google users) if the [Safari mobile] default search engine changes to something else." UPX0070 at -657.

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906. In 2012, Apple replaced Google Maps with Apple Maps as the default maps application on iOS, which created an immediate, sizeable, and lasting change in usage. Tr. 564:11–566:1 (Rangel (Pls. Expert)) (discussing reproduction of chart in UPX0097 at -.001, showing a large and sudden drop in Google Maps usage on iOS when Apple changed the default while, during the same period, usage of Google Maps on Android increased); Tr. 1558:3–5, 1560:4–20, 1563:25–1566:4 (Roszak (Google)) (Google Maps lost 60% of its usage vis-à-vis its peak usage—when it was the default maps application on iOS).

907. In 2012, Apple publicly apologized for Apple Maps' poor performance. Tr. 565:11–566:1 (Rangel (Pls. Expert)); Tr. 1569:15–18 (Roszak (Google)). As Prof. Rangel explained, the Apple Maps event illustrates that defaults are so powerful that they can generate bias among users "even when the default is assigned to an inferior product." Tr. 565:11–566:1 (Rangel (Pls. Expert)). According to Mr. Nadella, the 2012 Apple Maps event demonstrated "the power of defaults" and gave Microsoft confidence that winning the iOS default would be a "big game-changer" in search competition. Tr. 3500:9–3502:2 (Nadella (Microsoft)) ("[Apple Maps is] exhibit number one on anybody who wants to sort of know anything about sort of the power of defaults, that case study is the best.").

908. Mozilla's 2014 decision to switch the default search engine on its Firefox browser from Google to Yahoo sharply and immediately shifted approximately 20% of queries from Google to Yahoo—a phenomenon that was reversed in 2017 when Mozilla reverted the Firefox default to Google. Tr. 628:6–20, 630:8–631:14, 660:12–661:18 (Rangel (Pls. Expert)) (describing Firefox default change and referring to redacted query share shifts in UPXD101 at 55); Tr. 5729:25–5731:4 (Whinston (Pls. Expert)) (discussing redacted query share shifts in UPXD104 at 23 and explaining, based on "jump[s]" in query shares for Yahoo and Google in

[redacted]

2014 and 2017, respectively, that "[i]f defaults didn't matter, all of this would have been a nice, smooth—maybe not line, but curve. You wouldn't have seen these jumps"); Des. Tr. 62:9–18 (Baker (Mozilla) Dep.) (describing Firefox default switch in 2014). Mozilla's default switch cost Google an estimated half-a-billion dollars in 2015 along with a 30% decline in traffic from Firefox and a 45% decline in revenues from Firefox. Tr. 1610:2–1611:14 (Roszak (Google)) (discussing UPX0066 at -071).

909. As significant as these Firefox default effects were, they likely understate the power of the defaults controlled by the challenged agreements. First, because Firefox is not a pre-set default browser on any device in the United States, Firefox users are generally more tech savvy and therefore more likely than the average user to understand defaults and make a change. Tr. 628:6–20 (Rangel (Pls. Expert)). Second, Firefox is used almost exclusively on desktop, where defaults are less sticky than on mobile. Tr. 5731:6–21 (Whinston (Pls. Expert)) (lower switching is the result of Firefox being used primarily on desktop rather than mobile, which is more difficult to switch); Tr. 628:22–629:5 (Rangel (Pls. Expert)) (vast majority of Firefox queries come from desktops); *infra* ¶¶ 918–923.

910. Choice screens implemented by Google on Android devices in Russia and Europe illustrate the default effect by showing the consequence of removing a default. Tr. 610:6–611:18 (Rangel (Pls. Expert)). In 2017, Russian competition authorities required Google to implement a choice screen on Android devices, which resulted in a consistent and continuing loss in Google's Android query share that was picked up by the Russian search engine Yandex. Tr. 2673:12–2674:25 (Parakhin (Microsoft)) (describing Google's settlement with Russian regulators and explaining that Yandex was not able to maintain market share on mobile before 2017 because "very few users change defaults"); Tr. 608:14–609:9, 609:15–610:9, 610:19–612:1 (Rangel (Pls.

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Expert)) (discussing query share shifts with reference to redacted figures in UPXD101 at 44); Tr. 10001:23–10002:10 (Murphy (Def. Expert)) (agreeing that the choice screen contributed to Google's share decline in Russia); UPX0170 at -978 (depicting an approximate 19% search share loss for Google between 2017 and 2019 that resulted in Yandex overtaking Google as the leading search engine in Russia). Moreover, on Russian iPhones and desktops, where no choice screen was implemented and Google's default persisted, query shares held constant, demonstrating that the choice screen was in fact responsible for the Android share changes. Tr. 612:4–613:5 (Rangel (Pls. Expert)) (referring to UPXD101 at 45); Tr. 5744:7–20 (Whinston (Pls. Expert)) (referring to UPXD104 at 27). Google agreed that the choice screen was a "key" cause for Google's loss in Russian query share. UPX0170 at -979; UPX0760 at -596 ("[The Russian remedy] implementation (2016/17) predictably led to a decline Google's queries share on mobile.").

911. Similarly, the European choice screen implemented in 2021 following Google's Android settlement with the European Commission shifted query shares and generated competition that had not existed when Google was the default across Android devices. UPX0764 at -077 (Quality-enhancing efforts undertaken by Google as part of the "Go Big in Europe" initiative in response to the choice screen included improving unique features, local content, and trust). Tr. 620:22–624:4 (Rangel (Pls. Expert)) (referring to UPXD101 at 49); Tr. 5735:1–5737:19 (Whinston (Pls. Expert)) (referring to UPXD104 at 25) (Google's selection on the choice screen was lower than its market share before adoption of the choice screen).

912. A regression analysis using data from the European choice screen predicts that Google's U.S. rivals would acquire about 10% market share were a choice screen implemented in the United States. Tr. 5737:21–5738:10 (Whinston (Pls. Expert)). And although Google

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retained a high share in Europe following the choice screen, the "default echo" deriving from Google's incumbency and brand recognition makes this outcome unsurprising and was, in fact, anticipated by Google. Tr. 622:25–625:14 (Rangel (Pls. Expert)); Tr. 5732:15–5734:18, 5735:1–5738:22 (Whinston (Pls. Expert)) (referring to UPXD104 at 25 and explaining that the European choice screen showed consumer preferences at the time the choice screen was instituted and that there would be greater share moving away from Google if rivals were stronger); UPX1103 at -775 (Google email discussing the importance of brand recognition in differing outcomes with European and Russian choice screen experiments); *supra* ¶ 544 (discussing effect of brand recognition in Europe).

913. Finally, Google's query share differentials between browsers where Google is the default—such as Chrome, Firefox, and Safari—compared to Microsoft's Internet Explorer and Edge browsers, where Google is not the default, show that defaults drive search engine query shares. Tr. 5744:21–5745:20 (Whinston (Pls. Expert)) (referring to UPXD104 at 28–29); UPX0955 at -774 (2020 Email from Brave executive reporting that setting DuckDuckGo as the default search engine in Brave's browser in Germany, Ireland, Australia, and New Zealand showed the "data is very clear: default is sticky and very powerful."). In the context of desktop, Bing's query share on Windows computers, where it is the default search engine on the only preinstalled browser, compared to Bing's query share on Apple's Mac computers, where Google is the default search engine on the only preinstalled browser, shows a near seven-fold default effect. Tr. 631:23–632:17 (Rangel (Pls. Expert)) (referring to UPXD101 at 56).

5. Ordinary-Course Modelling For Multi-Billion Dollar Decisions Confirms That Search Defaults Have High User Retention Rates, Especially On Mobile

914. In 2016, Apple and Google renegotiated the ISA, a multi-billion dollar agreement. Tr. 1630:10–14 (Roszak (Google)) (agreeing that the Safari default's worth to Google was "an

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important question" that had "billions of dollars on the line"); *infra* ¶ 935 (overviewing size of Google payments to Apple).

915. For the negotiations, Google's finance team modeled the impact of losing Apple's Safari default, which Google considered a "Code Red" scenario. Tr. 1616:20–1618:15 (Roszak (Google)); Tr. 536:10–537:21 (Rangel (Pls. Expert)) (discussing UPX0171 at -169, -177); UPX0171 at -169, -177 (acknowledging that Google was "vulnerable" if Apple switched the default search engine); UPX0085 at -228, -230, -240 (discussing "Code Red" in the context of Project Soy, which was code for clawing back users on Apple's iOS).

916. To model the outcomes of losing the search default on Apple devices, Google applied the revenue shifts from the default losses on Firefox, *supra* ¶ 908, and Apple Maps, *supra* ¶ 906. UPX1050 at -828, -886 (January 2016 modelling relying on Firefox for desktop recovery and on Apple Maps for iPhone recovery); Tr. 1620:13–1631:18 (Roszak (Google)) (reviewing UPX1050 at –828, -886); UPX6024 at -440, -443 (written 30(b)(6) response: Google used Firefox and Apple Maps events "to model certain clawback assumptions" during 2016 ISA negotiations with Apple.).

917. For desktop, Google based its modeling on the outcome of Mozilla's changing the Firefox default from Google to Yahoo in 2014 and concluded that Google would lose [redacted]% of its revenue ([redacted]% recovery) if it lost the Safari default on desktop. UPX1050 at -828, -886; Tr. 1620:13–1621:25, 1626:13–1627:10 (Roszak (Google)) (reviewing UPX1050 at -828, -886).

918. For mobile, Google based its modeling on the outcome of Apple's switching the iOS maps application default from Google Maps to Apple Maps in 2012 and concluded that it would lose [redacted]% of its revenue ([redacted]% recovery) if it lost the Safari default on mobile. UPX1050 at -828, -886; Tr. 1622:1–1624:16, 1626:13–1627:10 (Roszak (Google)).

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919. In other words, Google predicted that its revenue loss on mobile ([redacted]%) would be *more than double* its revenue loss on desktop ([redacted]%). UPX1050 at -886; Tr. 1629:14–18 (Roszak (Google)).

920. The disparity between the default effect on mobile and desktop arises from the fact that "[d]efaults have more prominence in mobile due to screen size and UI [user interface]." UPX1050 at -886; Tr. 1628:8–1629:3 (Roszak (Google)). As Google explained in a later analysis, users "are much less likely to change default search engine on mobile." UPX0139 at -119 (2018 Google presentation discussing the "[s]ignificant risk if [iPhone] default [search] engine is changed"). Mobile and desktop user experiences have "salient difference[s]," including the "very limited real state" on mobile devices. Tr. 6310:23–6311:16 (Nayak (Google)).

921. These form factor differences between mobile and desktop, such as smaller screen size, are an example of choice friction that enhances the power of defaults on mobile devices. Tr. 523:14–24, 625:17–626:6 (Rangel (Pls. Expert)); UPX0084 at -728 (Google 2016 2Q Earnings Diligence – TAC Appendix stating, "User behavior is more heavily influenced by default settings on mobile and tablet"); Tr. 3498:5–19 (Nadella (Microsoft)) (changing defaults is easier on desktop than on mobile because "there are many, many sort of friction points on mobile operating systems").

922. Mobile users do, in fact, query mostly through defaults. Tr. 1632:3–14 (Roszak (Google)) (65% of Google's queries from Apple iOS came through the Safari default); Tr. 3102:11–3104:25 (Tinter (Microsoft)) (fewer users reach search engines directly on mobile devices and instead rely on search access points with pre-set defaults); Tr. 3499:21–3500:8 (Nadella (Microsoft)) (although mobile devices have "multiple search access points, the one access point that matters is the search default on the browser"); UPX0083 at -967 (25% of

[redacted]

mobile queries are non-default compared to 32% on tablet and 74% on desktop); UPX0115 at -142 (Microsoft estimates that defaults are responsible for 68% of mobile search volume). In 2020, Google found that 81% of all of Google's daily active users accessed Google through Safari, the browser preloaded on iPhones where Google is the default. Tr. 7512:23–7514:8 (Raghavan (Google)) (discussing UPX2051 at -519).

923. The enhanced power of defaults on mobile is significant because the vast majority of querying today occurs on mobile devices. Tr. 5798:17–5799:5 (Whinston (Pls. Expert)) ("it's important to remember mobile is where the market is growing" and that desktop queries are "flat and have been for a long time"); Tr. 2279:20–2280:9 (Giannandrea (Apple)) (in the last few years more queries are being done on mobile than on desktop); Tr. 3098:6–3099:3 (Tinter (Microsoft)) (the general search services market has changed from being "predominantly PC to predominantly mobile").

924. Consequently, weighting between mobile and desktop revenue mix on Apple devices, Google projected a total revenue recovery that skewed heavily toward its mobile prediction—[redacted]% total recovery ([redacted]% total loss). UPX1050 at -886; Tr. 1627:11–24 (Roszak (Google)).

925. The predictions derived from the Firefox and Apple Maps events were Google's "best guess expectation" that were applied in multiple scenarios. Tr. 1622:21–1624:11, 1743:1–1744:10 (Google (Roszak)). These findings were shared with Google CFO Ruth Porat. *Id.* 1619:23–1620:12. Mr. Roszak, the leader of the Google finance team assessing default deals, testified that he was unaware of any better data upon which to base revenue recovery assumptions than the Firefox and Apple Maps events. *Id.* 1638:13–1639:20. Google also used the same Firefox and Apple Maps events to make the same recovery assumptions five years later, in

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2021, when considering the possibility of Apple entering the general search services market. UPX0148 at -826; Tr. 1633:16–21, 1635:21–1638:1 (Roszak (Google)).

926. The Apple Maps event has also been an input to model recovery rates if Google lost the default on Samsung's S Browser and if Chrome and the Google Search App were not pre-installed on Android devices as well. Tr. 1640:19–1642:14 (Roszak (Google)) (discussing UPX0323 at –540, which projected [redacted]% to [redacted]% recovery loss based in part on "iOS Maps default change"); UPX0146 at -412 ("S Browser default changes and we clawback [redacted]%" based partly on "iOS Maps Recovery"); UPX6024 at -442–43 (written 30(b)(6) response: "[I]n analyzing provisions of the RSA in 2020, Google personnel used clawback estimates of between [redacted]% (based on Google's experience with Apple Maps) to [redacted]% (based on Google's experience on Microsoft's Edge browser) to assess revenue related to default search on third-party browsers.").

927. Nor was Google alone in its analysis; both Microsoft and Apple independently reached conclusions regarding query recovery that were similar to Google's. Tr. 10497:2–10500:5 (Whinston (Pls. Expert)). For its own analysis during the same negotiations in 2016, Apple assumed that [redacted]% of queries would continue to run through the default were Apple to change the Safari default to Bing. UPX0095 at -331. This is nearly identical to Google's weighted [redacted]% revenue recovery (i.e., [redacted]% revenue loss) modelling. *Supra* ¶ 924. Two years later when considering acquiring or co-owning Bing, Apple—in estimates provided to CEO Tim Cook—predicted that a new, non-Google default search engine could retain between [redacted]% and [redacted]% of queries with an intermediate model of [redacted]% query retention. UPX0460 at -176; Des. Tr. 211:4–24, 212:23–213:12 (Perica (Apple) Dep.) (query retention rates of [redacted]%, [redacted]%, and [redacted]% in UPX0460 at -176 came from the relevant experts at Apple).

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928. In 2016, Microsoft assumed that [redacted]% of mobile search volume going through the Safari default would shift to Bing if it were to become the default. Tr. 10497:2–10500:4 (Whinston (Pls. Expert)) (discussing UPXD106 at 19); UPX0069 at -236. This too resembles Google's modelled [redacted]% mobile revenue loss attributable to a default switch. S*upra* ¶ 918. Also like Google, Microsoft assumed "higher churn" on desktop "as it is easier for users to switch defaults on desktop browser." UPX0115 at -142 (estimating that Microsoft could capture significantly greater query share on mobile iPhones (54%) than desktop Macs (16%)); Tr. 3264:23–3265:14 (Tinter (Microsoft)) ("Defaults matter less" on desktop). In fact, Microsoft even distinguishes "PC search" from "mobile search" because of differences in keyboards and screen sizes. *Id*. 3094:12–24. "On a mobile platform more than anywhere else, even more than on the PC, default is the only thing that matters." Des. Tr. 143:7–23 (van der Kooi (Microsoft) Dep.).

929. In a 2018 presentation to Apple, Microsoft projected that obtaining the Safari default could boost Microsoft's query share on iPhones by 55 percentage points (or 29 fold), from approximately 2% to 57%. UPX0116 at .028; Tr. 3278:10–3279:15 (Tinter (Microsoft)) ("This was the highest fidelity estimates that we had based on the best of our knowledge and our experience and our ability of what we thought was likely to happen"). And like Google, Microsoft used the Apple Maps event "to sanity check" Microsoft's assumptions for modelling a potential deal for the Safari default. *Id*. 3266:13–3268:3.

930. In sum, these similar models across three sophisticated companies are significant —and more than "thought experiments"—because they were used in very detailed ways to make business decisions about enormous sums of money. Tr. 5717:1–7, 5719:20–5721:25, 5751:1–5752:5 (Whinston (Pls. Expert); *supra* ¶¶ 925–927 (Google's modelling were based on best available data and shared with CFO); *supra* ¶ 927 (Apple's estimates were based

[redacted]

on analysis from experts and shared with CEO); *supra* ¶ 929 (Microsoft's estimates were "highest fidelity estimates"). As Mr. Tinter explained, the accuracy of these models was important because they were being used as the basis for decisions about "very large financial investments" and as the basis for negotiations with partners. Tr. 3278:23–3279:15 (Tinter (Microsoft)).

931. Drawing from market participants' estimates and real-world data, Prof. Whinston predicted that at least 33% of all U.S. queries—including 49% of all U.S. mobile queries—would shift from Google to its rivals if Google lost all the defaults controlled by the challenged contracts; this would quadruple rivals' total U.S. query share. Tr. 5749:17–5752:5 (Whinston (Pls. Expert)) (explaining analysis with reference to UPXD104 at 31); *id*. 10497:2–10499:15 (explaining analysis with reference to UPXD106 at 19).

6. Google's Enormous Payments And Microsoft's Enormous Bids For Defaults Corroborate The Power Of Search Defaults

932. Because of the effect of defaults on query share, control of defaults are "very valuable." Tr. 7684:18–20 (Pichai (Google)); *id.* 7666:19–24 (agreeing "Google pays for these exclusive defaults because they have value in distributing Google Search"); *id.* 7661:1–11 ("[T]here's clear value" in making Google Search the default search engine in Safari.); Tr. 830:22–23 (Kolotorous (Google)) (agreeing Google finds defaults "valuable"); Tr. 4935:11–18 (Braddi (Google)) (agreeing Apple's Safari default "is valuable to Google because it drives more queries to Google Search"); Tr. 154:20–21 (Varian (Google)) (Being the default has "some advantages."); Tr. 329:18–20 (Barton (Google)) (agreeing that he "view[ed] search defaults as "valuable").

933. Because "the default is valuable," Google pays "tens of billions of dollars every year" to be the default search engine across search access points in the United States. Tr. 7669:4–

[redacted]

14 (Pichai (Google)). Asked by the Court, based on his experience at Google, for the business justification for Google's payments to search distributors, Dr. Ramaswamy explained that defaults are "enormously powerful because . . . pious prose around 'competition being a click away,' notwithstanding in practice, they [users] don't change." Tr. 3796:5–3798:22 (Ramaswamy (Neeva)). Mr. Roszak, Google vice president of finance with long-time responsibilities related to the default distribution deals, is not aware of any default distribution deal that Google has ever entered where the traffic acquisition cost exceeded the expected incremental return. Tr. 1534:24–1536:21, 1540:19–22 (Roszak (Google)).

934. The total TAC payments incurred by Google' s search business (i.e., including payments to partners for default distribution of Google Search) more than tripled between 2014 and 2021—from $7.1 billion to $26.3 billion. Tr. 7521:2–16, 7576:16–21 (Raghavan (Google)) (testifying about UPX0453 and UPX7002.A); UPX7002.A at .001.

935. Google's overall worldwide revenue share payments to Apple were approximately $20 billion in 2022. Tr. 2492:22–2493:6 (Cue (Apple)). In fiscal year 2020, Google's payments to Apple—the largest company in the world by market capitalization—constituted 17.5% of Apple's operating income. Tr. 5727:5–5728:11 (Whinston (Pls. Expert)) (referring to UPXD104 at 19); UPX1110 at -41046 (For each quarter in fiscal year 2020, Google's payments to Apple as a percentage of operating income were 21.5%, 19.2%, 21.1%, and 11.6%.); UPX0635 at -352 (Apple recognized in 2018 that "G search deal is [redacted]% of corporate EBIT."); *compare* UPX8105 at -203 ($66.288 billion in Apple worldwide operating income for fiscal year 2020) *with* Tr. 2491:1–2492:8 (Cue (Apple)) (reviewing UPX1109 at -038, Apple's fiscal year 2020 revenue share payments from Google were $11.58 billion.). Further, Google's revenue-share payments to Apple have grown consistently. *Id.* 2489:23–

[redacted]

2490:25 (discussing UPX1109 at -036, agreeing that Google's monthly revenue-share payments to Apple "have been on a pretty steady upward trajectory" and grew from $418 million in January 2017 to $1.5 billion in August 2021); UPX0460 at -149 (Global ISA payments grew from $2.2 billion in 2014 to $8.6 billion in 2018.); UPX1109 at -026 ("Google reported $1,532M (+46% Y/Y) revenue share for the month of August '21, recording the highest revenue share in history for the fourth straight month."); Tr. 2488:2–2489:6 (Cue (Apple)) (The April 2021 record streak in Google revenue-share payments to Apple continued.). In fiscal year 2020, Google's payments to Apple for Safari address-bar queries alone exceeded $9.6 billion and surpassed a billion dollars every month by May 2021. UPX1109 at -036, -038 (total of payments for "Safari Rev Share" from Oct. 2019 to Sept. 2020); Tr. 2488:9–2492:21 (Cue (Apple)).

936. Google has paid billions of dollars in revenue share to Android RSA partners over the years. Tr. 7667:12–15 (Pichai (Google)); Tr. 5727:5–5728:11 (Whinston (Pls. Expert)) (explaining UPXD104 at 19, Google has paid its RSA partners, including Android partners, "billions and billions and billions of dollars."). In 2020 alone, Google's payments to carriers and Android OEMs for U.S. searches totaled more than $1.5 billion. *Id.* 5727:5–5728:11 (referring to UPXD104 at 19). Google also gives away the "must-have" Play Store on Android at no monetary cost to Android OEMs. Tr. 9426:17–18 (Rosenberg (Google)) (There is no license fee for the MADA.); Tr. 5727:5–5728:11 (Whinston (Pls. Expert)).

937. Google's revenue-share payments to Mozilla make up approximately 80% of Mozilla's revenue. Des. Tr. 41:18–24 (Baker (Mozilla) Dep.). In 2021, Google's revenue-share payments to Mozilla exceeded $[redacted] million worldwide. Tr. 538:1–15 (Rangel (Pls. Expert)) (referring to UPXD101 at 10); Des. Tr. 190:12–17, 190:21–191:2, 191:5–10 (Baker (Mozilla) Dep.) (Google's revenue share to Mozilla "ends up in the hundreds of millions of dollars.").

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938. Google's payments to third-party browser partners—excluding Apple—totaled more than $150 million in 2020 for U.S. default search traffic. Tr. 5727:5–5728:11 (Whinston (Pls. Expert)) (referring to redacted figures in UPXD104 at 19).

939. The massive size of Google's default revenue share payments confirms the value of these defaults; Google is a sophisticated, successful, for-profit corporation that would ensure these payments are worthwhile. Tr. 5727:5–5729:5 (Whinston (Pls. Expert)) ("[W]hen you see Google paying billions and billions and billions of dollars, there's got to be a reason. There has to be a reason it's worth doing it."); Tr. 538:1–15 (Rangel (Pls. Expert)). Google's willingness to invest billions of dollars to secure defaults shows that the default bias in search is "of sufficient magnitude" for "participants in the market [to] care about" and invest billions of dollars to influence them. Tr. 524:15–25, 538:1–15 (Rangel (Pls. Expert)).

940. Consistent with his fiduciary obligation to shareholders, Mr. Pichai would not authorize contracts to pay billions of dollars every year for search defaults if they were not valuable. Tr. 7669:15–25, 7773:13–18 (Pichai (Google)); Des. Tr. 29:19–30:1 (Porat (Google) Dep.) (agreeing that "the value of the acquired traffic that Google gets from the TAC payments exceeds . . . the cost of the payments that Google makes" and that "[o]therwise, [Google] wouldn't make the payments"); Tr. 3796:5–3798:22 (Ramaswamy (Neeva)) ("[S]earch is one of the most profitable businesses ever. And so defaults in search, therefore, have a very meaningful impact on . . . Google's top and bottom line.").

941. At a [redacted]% revenue recovery rate, *supra* ¶ 924, Google stood to lose more than $7 billion in 2020 and more than $28 billion between 2016 and 2020 if Apple changed the Safari default. UPX1050 at -887; Tr. 1629:19–1631:18 (Roszak (Google)) (discussing UPX1050 at -887).

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942. The 36% gross revenue share that Google agreed to pay Apple in the 2016 amendment to the ISA, *supra* ¶ 226, offers an economic perspective of the magnitude of the default effect in search. Tr. 5728:12–5729:5 (Whinston (Pls. Expert)). For Google's revenue-share payments to make economic sense, the revenue Google expects it would lose if a rival won the default must exceed the traffic acquisition costs of obtaining the default. *Id.* As a result, Google must expect to lose *at least* 36% of Safari default traffic revenue if Apple were to switch the Safari default. *Id.* (discussing UPXD104 at 20); Des. Tr. 29:19–30:1 (Porat (Google) Dep.) (agreeing that "the value of the acquired traffic that Google gets from the TAC payments exceeds . . . the cost of the payments that Google makes" and that "[o]therwise, [Google] wouldn't make the payments"); *id.* 32:15–32:22 (agreeing that "the purpose of [Google's] payment [to Apple] is to get the additional or marginal traffic that [Google doesn't] get today"); Tr. 1540:5–9 (Roszak (Google)) (defining incremental revenue).

943. Ultimately, because defaults are the most potent method of distribution, Mr. Nadella was prepared for Microsoft to lose "billions of dollars" to secure the Apple's search defaults. Tr. 3502:21–3505:23 (Nadella (Microsoft)) ("[Microsoft was] always grounded in the fact that if [Apple] needed to switch, that [Microsoft] would have to pay, and [Microsoft] would have to pay and even subsidize the transfer . . . we were going to be negative for multiple years perhaps, and I was willing to do essentially a very long term and think perpetually."); Des. Tr. 111:20–112:20 (van der Kooi (Microsoft) Dep.) (Microsoft's former CEO Steve Ballmer "was deeply committing to investing in the search business beyond . . . what was, let's say, purely economically justifiable. . . . There is not really another company in the world that you can imagine that would have had the wherewithal and the staying power to incur that degree of losses over that period of time other than Microsoft.").

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VII. GOOGLE'S RIVALS ARE FORECLOSED FROM DISTRIBUTION

944. The challenged contracts foreclose a substantial portion of each relevant market. And Google's ownership of Chrome (which defaults to Google) magnifies that foreclosure.

A. Google's Conduct Forecloses A Substantial Share Of General Search Queries Performed In The United States

945. Google's exclusionary search distribution contracts with Apple, U.S. carriers, Android OEMs, and third-party browsers foreclose rivals from a substantial share of the general search services market. Tr. 5752:11–17 (Whinston (Pls. Expert)) ("[G]oogle's search distribution contracts foreclose rivals from a substantial share of each relevant market.").

946. "[F]oreclosure is measured by looking at the percentage of the market that's tied up by the contracts." Tr. 5752:18–5753:1 (Whinston (Pls. Expert)); Tr. 10003:14–10004:10 (Murphy (Def. Expert)) (agreeing that foreclosure is "about the ability to compete" and that people should not "confuse the outcome in terms of shares with the ability to compete[,] which are two different things").

947. This definition makes economic sense because it is "identifying . . . the fundamental force that these contracts are having"; it is asking, "what do these contracts do if they're in place." Tr. 5753:2–9 (Whinston (Pls. Expert)); *id.* 10509:15–10510:9 (foreclosure measures queries accessible to rivals while the contracts are in place).

948. Foreclosure is not the difference in market shares between this world and a but-for world. Tr. 5779:18–5780:3, 10508:3–10509:5 (Whinston (Pls. Expert)); Tr. 10003:14–10004:10 (Murphy (Def. Expert)) (agreeing that foreclosure is "about the ability to compete" and that people should not "confuse the outcome in terms of shares with the ability to compete[,] which are two different things").

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949. A but-for world is the world that would have existed in the absence of an event or course of conduct—in this case, the but-for world would be the world that would have existed in the absence of Google's exclusionary contracting practices. Tr. 5774:19–25 (Whinston (Pls. Expert)); *infra* ¶¶ 971–1192 (§ VIII) (more detailed discussion of but-for worlds and competitive effects).

950. How much foreclosure has occurred because of Google's contracts is a different question from what the competitive effects of those contracts are or, even more broadly, what would have happened in the absence of the contracts over the past 10 years. Instead, foreclosure simply describes how much of the market Google's exclusive contracts tie-up when they are in place. Tr. 5778:4–19, 10508:3–10509:5 (Whinston (Pls. Expert)); Tr. 10008:8–19 (Murphy (Def. Expert)) (Prof. Murphy used the counterfactual of choice screens to determine if the challenged conduct harms the competitive process, but not for measuring foreclosure.).

951. Foreclosure is "an input in some sense to thinking about competitive effects." Tr. 5778:4–19, 10508:3–10509:5 (Whinston (Pls. Expert)).

952. Coverage is a reasonable measure of foreclosure because these queries are affected by the exclusionary provisions in Google's contracts. For these queries, it is not just Google's quality that matters, it is also the presence of Google's contractual defaults. Tr. 5755:5–5756:25, 5763:23–5764:5 (Whinston (Pls. Expert)).

953. Using coverage as a measure of foreclosure, even though users can technically get around defaults to reach a search rival, is not unique to this case—"[c]onsumers typically have some way of getting to rivals that isn't the distributors that are subject to the exclusive provisions." Tr. 5764:9–25 (Whinston (Pls. Expert)).

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954. The exclusive defaults secured by Google's exclusionary contracts cover 50% of all general search queries performed in the United States. Tr. 5755:5–16 (Whinston (Pls. Expert)) (explaining that 50% is the "share of U.S. queries that are . . . covered by Google's exclusive defaults. They're the queries that are going through the defaults that are affected by exclusionary provisions"); *id*. 10506:12–10508:2 (explaining UPXD104 at 35, "50 percent was the share of U.S. queries covered by Google's exclusive contracts. . . . That represents the share of U.S. queries where . . . the fact that Google is the default could affect people's choices."). This does not include queries from (1) the Google bookmark in Safari, (2) the Google Search App for iOS, or (3) Chrome on Windows or Apple devices. *Id.* 5761:16–18, 5762:22–5763:13 (explaining UPXD104 at 35).

955. In addition to coverage, Prof. Whinston provided a separate calculation to measure the strength of Google's defaults even in the face of implausibly large improvements in rival quality. He did this by estimating the share of U.S. search queries that Google's contracts "make unavailable even to a much stronger rival." Tr. 5755:5–16 (Whinston (Pls. Expert)). Because "consumers have some variation in how affected they are by defaults," the amount of the market the contracts make conceivably available "depends on the strength of rivals." *Id*. 5753:10–5754:5. By estimating the number of queries that would stay with Google even if a rival became much stronger than Google, Prof. Whinston calculated a conservative estimate of the power of Google's search defaults.

956. Prof. Whinston found that the set of queries covered by Google's contracts that are performed by users who will rely on the default GSE, even when much better alternatives exist, account for 33% of all general search queries performed in the United States (or two-thirds of all covered queries). Tr. 5755:17–5756:25, 5764:9–25, (Whinston (Pls. Expert)) (explaining

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the 33% is "the share of U.S. queries that Google's exclusive defaults make unavailable even to a much stronger rival," i.e., a rival as much better than Google as Google is better than rivals today (Super Duck)); *id*. 10506:12–10508:2 (explaining the 33% of all U.S. queries represents a "lower bound on the proportion of people who won't change their default"—there are no "plausible investments . . . rivals can make to try to win these people" when Google is the default). Thus, Prof. Whinston's 33% figure bolsters the significance of Plaintiffs' foreclosure estimate for general search services. *Id*. 5755:5–16, 10506:12–10508:2.

957. The 33% comes from the default share-shift that Prof. Whinston calculated using the estimates Google, Microsoft, and Apple calculated and the Mozilla Firefox default-switching event that Google relies upon. *Supra* ¶ 931.

958. When Google and Microsoft worked up their own default share-shift estimates they were looking at what would happen if Google lost the Safari default to a rival at current quality levels, i.e., a much weaker rival. Tr. 5765:16–5768:1 (Whinston (Pls. Expert)).

959. By the same logic, these share shift estimates also describe what share of U.S. queries Google would be able to retain due to its default contracts if a rival became much stronger than Google (i.e., Google became the much weaker rival). *Id.* ("[I]magine that a rival--you know, DuckDuckGo or some other rival invested so much and was so successful at raising its quality that it was as much better as Google as Google now is to the rivals, okay. Well, this same [33%] number is telling me the answer, because this number is telling me what the much . . . stronger rival would get and what the much weaker rival would get.").

960. With Google's exclusionary contracts in place, even a much stronger rival would be able to attract at most one-third of the covered queries. Tr. 5768:19–5770:13 (Whinston (Pls. Expert)). How much of those queries a rival would be able to attract would depend on how much

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stronger they were than Google. *Id*. 5765:16–5768:25 (a much stronger rival may be able to attract some of the covered queries).

961. There are no plausible investments a rival could make to attract the remaining two-thirds of covered queries. Tr. 10506:12–10508:2 (Whinston (Pls. Expert)).

962. Both coverage and the default share-shift would be higher on mobile only. Tr. 5757:1–9 (Whinston (Pls. Expert)).

963. In contrast, when calculating foreclosure, Google's expert Prof. Murphy did not rely on the ordinary course estimates performed by Google, Microsoft, or Apple. Tr. 10056:6–10057:1 (Murphy (Def. Expert)) (rejecting Google estimate); *id*. 10059:14–10060:7 (rejecting Microsoft estimate); *id*. 10061:6–10062:3 (rejecting Apple estimate); *id*. 10063:22–10066:20 (rejecting additional Google estimates regarding Android devices); *id*. 10006:2–8 ("[M]y view of the world is the actual world is the but-for world because they're not anticompetitive.").

964. Prof. Murphy acknowledges that there is a segment of users who are inclined to use whatever search engine is set as the default, but he did not estimate how many users fall into this segment. Tr. 9943:23–9944:7, 9945:3–11 (Murphy (Def. Expert)). Instead, Prof. Murphy testified that "foreclosure is zero in this case." *Id*. 10006:17–25. Prof. Murphy reached this conclusion based on his belief that the general search market is fully competitive, even with Google's contracts in place. *Id*. 10006:2–8. It was his position that search rivals are "not denied the ability to compete" for any queries due to Google's contracts. *Id*. 10006:17–25.

B. Google's Conduct Forecloses A Substantial Share Of Text Ads And Search Ads In The United States

965. The exclusive defaults secured by Google's exclusionary contracts cover 45% of all Text Ads revenue in the United States. Tr. 5772:20–5773:2 (Whinston (Pls. Expert)) (referencing UPXD104 at 39). This does not include Text Ads revenue earned through the

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Google bookmark in Safari, the Google Search App on iOS, or Chrome on Windows or Apple devices. *Id.* 5772:20–5773:2 (referencing UPXD104 at 39 and explaining that the coverage figure for Text Ads is "doing exactly the same thing" as the general search service coverage figure "but for search text ad revenue").

966. The exclusive defaults secured by Google's exclusionary contracts cover 36% of all Search Ads revenue in the United States. Tr. 5773:3–7 (Whinston (Pls. Expert)) (referencing UPXD104 at 40). Similarly, this does not include Search Ads revenue earned through the Google bookmark in Safari, the Google Search App on iOS, or Chrome on Windows or Apple devices. *Id.* 5773:3–7 (referencing UPXD104 at 40 (see note below chart)).

967. A conservative estimate of the percentage of users who are not conceivably available to even a much stronger rival for each ads market would be two-thirds of the coverage estimate. Tr. 5773:8–17 (Whinston (Pls. Expert)). This estimate is conservative because evidence suggests that changing a default shifts a higher percentage of ad revenue than queries. *Id.* 5773:18–5774:1 (discussing UPX0066 at -071, which estimates that Google lost 30% of its default traffic and 45% of its default revenue after Mozilla switched the Firefox default to Yahoo). These high numbers confirm the substantiality of the 45% and 36% foreclosures for Text Ads and Search Ads, respectively.

C. The Foreclosure Created By Google's Agreements Is Enhanced By Google's Ownership Of The Chrome Browser

968. About 20% of all general search queries in the United States go through the default on user-downloaded versions of Chrome (e.g., Chrome on Windows and Apple devices). Tr. 5763:9–13, 5765:6–15 (Whinston (Pls. Expert)) (user-downloaded Chrome includes Chrome on Windows and Apple devices; explaining that the yellow part of the bar (20%) on UPXD104 at 37 is user-downloaded Chrome); *id*. 10639:10–17 (20% of U.S. search queries come through

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user-downloaded Chrome). These are defaults not challenged by Plaintiffs' complaint but still affect the portion of the relevant markets available to rivals and thus magnify the significance of the foreclosure created by the challenged agreements.

969. Because Google always sets itself as the Chrome search default, rivals cannot achieve distribution by being set as that default. In other words, queries going through the default on user-downloaded Chrome are not "fully available" to Google's rivals. Tr. 922:19–23 (Kolotouros (Google)) ("Chrome, as an application, has Google as the default search engine, that is correct."); Tr. 5768:2–18 (Whinston (Pls. Expert)) (User-downloaded "Chrome queries are not fully available . . . to rivals, because Chrome is coming with a default in it to Google."); *id.* 10639:10–19 (Google sets itself as the default on Chrome, which means rivals cannot access default distribution through Chrome.).

970. Even if Google is not engaging in exclusionary conduct by setting itself as the default on Chrome, the presence of Chrome makes the foreclosure caused by Google's exclusionary contracts more significant. Tr. 5768:2–18 (Whinston (Pls. Expert)) (explaining that the presence of Chrome "color[s]" what the foreclosure range means—"when you think about these numbers [the 33% and the 50%,] . . . you shouldn't think of it . . . relative to a hundred percent. You really should think of it in some sense relative to some smaller possible available market because of the presence of Chrome."); *id.* 5752:18–5753:9 (discussing UPXD104 at 33, which states that foreclosure analysis needs to "consider[] how much of the market is available to rival sellers.").

VIII. ANTICOMPETITIVE EFFECTS ARISING FROM GOOGLE'S CONDUCT

971. "[C]ompetition matters because it determines the outcomes in markets," i.e., the quality and price of the products and services available to (1) consumers, in the case of general

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search services, and (2) advertisers, in the case of the ads markets. Tr. 5774:7–13 (Whinston (Pls. Expert)).

972. Unlike foreclosure, competitive effects are ideally estimated relative to a but-for world. Tr. 5774:14–5774:25 (Whinston (Pls. Expert)). But, here, it is impossible to know what a but-for world would look like. *Id*. 5775:1–5776:21 (A but-for world is impossible to determine; there are too many unknowns about what would have happened but for Google's behavior.). There are many uncertainties about what market participants, including Google, and potential market participants would have done but for Google's exclusionary contracts. *Id.* For example, Google might have entered into unconditional revenue sharing agreements, Google might have entered most-favored supplier contracts, or Google may not have entered into any search distribution contracts. *Id*. 5775:1–5776:5. It cannot be known how, in response to changes in Google's conduct, rivals might have changed their search investments and what impact those investments would have had on search quality. *Id*. 5776:6–21. Rivals may have expanded, and new rivals might have entered. *Id.*

973. Determining what the but-for world would have looked like in this case would require a "time machine into a world that doesn't exist." Tr. 5775:1–5776:5 (Whinston (Pls. Expert)). Because of these uncertainties, a competitive effects analysis cannot yield a precise quantitative answer. *Id.* 5776:6–21 ("[I]t's just an impossibility."). Instead, a Section 2 competitive effects analysis will necessarily be a qualitative exercise examining how competition may have changed if Google's exclusionary contracts were not in place for a decade. *Id.* 5776:22–5778:3 (It is possible to consider less restrictive alternatives and how those less restrictive alternatives change "the fundamental forces in the market," which in turn "would change market outcomes.").

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974. There are many possible alternatives that would have been less restrictive than Google's contracts, two of which are: (1) unconditional revenue share payments and (2) most-favored supplier agreements. Tr. 5776:22–5777:14 (Whinston (Pls. Expert)). Both of these alternatives would have created a "more equal playing field in terms of [general search] distribution." *Id.* 5777:15–5778:3.

975. In his assessment of competitive effects, Prof. Murphy disregarded a wide range of outcomes that could have arisen but for Google's contracts. For example, he did not analyze the impact of a rival gaining a single exclusive default on Android or Apple devices because he assumed this would not happen, even in the absence of Google's contracts. Tr. 10013:14–10014:3 (Murphy (Def. Expert)) (On Android, "I don't believe they would."); *id.* 10027:8–13 (On iOS, he had no opinion on what share rivals would gain if they had exclusivity because he "[did not] believe that would happen in the but-for world.").

976. Prof. Murphy also disregarded the impact of any potential new entry, including by Apple or Branch, because he assumed that no additional entry would have occurred absent Google's contracts. Tr. 10047:22–10048:10 (Murphy (Def. Expert)) ("I don't think there would have been additional entry, no."); *id.* 10016:3–16, 10022:9–15 (did not consider the impact of Apple entering search because he "didn't see why that would be a relevant question here" and it "wasn't important for what [he] was doing"); *id.* 10040:4–24 (did not consider the impact of Branch entry because "[i]t came up late in the case" and Branch "does something different"); *id.* 10040:25–10042:20 (no opinion about the likelihood of Branch entering general search).

977. Google's search distribution contracts harm competition in the general search services, Search Ads, and Text Ads markets in the United States in at least two ways: (1) the contracts prevent rival GSEs from accessing scale, weakening them as competitors; and (2) the

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contracts reduce the incentives to compete on quality and price for Google, current rivals, potential entrants, and distributors. Tr. 5781:8–5782:8 (Whinston (Pls. Expert)). This reduced competition reduces the quality and options available to consumers in all three markets. *Id.* 5854:11–20).

A. Google's Contracts Prevent General Search Services From Accessing Scale And Reduced Scale Directly Reduces The Quality Of Rivals To The Detriment Of Consumers And Advertisers

1. Google Has Significantly Greater Scale Than Its Rivals

978. "Scale" refers to the amount of user-side data a search engine accumulates. User-side data includes: (1) the user query, (2) the ranked results returned by the search engine, (3) corresponding data generated from the user's interactions with the results of a query, and (4) information, such as location and device type, about the user issuing a query. *Supra* ¶¶ 159–162.

979. Google receives nine times more queries in a day than all its rivals combined. Tr. 4761:4–24 (Whinston (Pls. Expert)) (endorsing UPXD102 at 47). For mobile queries, Google's scale advantage is even starker. Google receives 19 times more mobile queries in a day than all its rivals combined. *Id.* 4762:19–4763:2 (endorsing UPXD102 at 49); Tr. 2662:20–2663:3 (Parakhin (Microsoft)) (In the United States Bing's mobile share "is immaterial, it's probably around 3[%]."). Google's scale advantage on mobile is particularly meaningful because that is where the search market has been growing. Tr. 5798:17–5799:5 (Whinston (Pls. Expert)).

980. Google has a meaningful scale advantage not just in the volume of queries, but in the breadth of queries it sees. Tr. 5785:11–5786:23 (Whinston (Pls. Expert)) (discussing UPXD104 at 44). That is, Google sees a wider variety of queries that other search engines do not see. Prof. Whinston analyzed 3,708 million unique query phrases issued on Google and Bing during the week of February 10–16, 2020 (e.g., "Facebook," "what's the weather in DC," or "the restaurant with the green awning on State Street in Madison, Wisconsin," would all be

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considered unique query phrases). Prof. Whinston found that for desktop and mobile combined, 93% of all unique search phrases were seen only by Google, 4.8% were seen only by Bing, and 2.2% were seen by both search engines. For mobile phones, 98.4% were seen only by Google, 1% were seen only by Bing, and 0.7% were seen by both. *Id.* 5785:5–5789:13 (referencing UPXD104 at 44). Because the unique search phrases that were seen on both Bing and Google tended to be frequently issued queries (like "Facebook"), Prof. Whinston found that about half of all queries issued during this period were phrases that only Google saw. *Id.* 5789:14–5790:23 (referencing UPXD104 at 44).

981. Google's scale advantage extends to tail queries. Tail queries refer to queries that individually do not occur many times in the query stream. Tr. 1811:4–25 (Lehman (Google)) (A long-tail query is a "rare query," and these are "masses of . . . queries that are extremely rare individually, but collectively, they make up a significant part of the query stream."); DX0678 at -030 (Microsoft document identifying head, torso, and tail queries as each around one-third of the query stream); UPX1079 at -996 (Google document identifying the same); *id.* (noting that the first "1/3 of traffic," head queries, are only "0.1% of distinct queries" and the last third of traffic (tail queries) are "90% of distinct" queries.). The definition of a tail query is relative to the volume and composition of a GSE's query stream—the same query can be a tail query on one search engine and a head query on another. Tr. 2676:5–11 (Parakhin (Microsoft)) ("For example, if tomorrow on my home machine I . . . create [a] search engine, every single query will be [a] tail query for it, right. But for Google, of course, many queries would be very much head queries."); Tr. 10341:23–10342:24 (Oard (Pls. Expert) ("If you had 5 percent of [Google's] data, that amount of user-side data, and you had something that was occurring once or twice a month, it would occur, at most, once a year. So something that looks to Google as something they can

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model, something they can work on, is invisible when you only have 5 percent of the user-side data, because your long tail gets to zero, whereas somebody that has 20 times as much user-side data will see 10 or 20.").

982. Google maintains a significant advantage over its competitors for tail queries. For example, Prof. Whinston's query analysis found that for query phrases seen between 1 to 4 times on Google (a proxy for a tail query), 99.8% were not seen by Bing at all. Tr. 5789:14–5790:23 (Whinston (Pls. Expert)) (referencing UPXD104 at 44).

983. Google also has an advantage in fresh queries. The term "fresh" is used to describe recency in scale or queries. Tr. 2251:10–23 (Giannandrea (Apple)) (Freshness means that the answer is more up to date.). Due to Google's query volume, the company has a significant scale advantage in fresh queries. UPX0227 at -134 (noting "billions of times each day" Google searches "gives us another example, another bit of training data").

984. Google continues to accumulate scale. From 2010 to 2021, the total number of queries Google received per year quadrupled from approximately 200 billion in 2010 to approximately 800 billion in 2021. Tr. 5829:23–5830:12 (Whinston (Pls. Expert)) (discussing UPXD104 at 56).

2. By Depriving Rivals Of Scale, Google's Contracts Harm Competition In The General Search Services Market

985. Google's contracts deprive rivals and potential entrants of the scale necessary to compete with Google's search quality. First, scale is a crucial ingredient to the iterative cycle of search engine improvement. The central way GSEs learn how to return better results is by observing users. Because of Google's contracts, rivals are unable to access valuable data—especially, in key query segments like tail, mobile, and fresh queries. Second, Google further weakens rival's ability to compete by depriving them of sufficient scale to fuel their development

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cycle. A crucial method of GSE development is through live experimentation. Without sufficient scale, rivals cannot quickly and accurately identify areas for improvement and test their product development ideas on real users. Thus, without sufficient scale rivals cannot effectively compete with Google's search quality.

a) Scale Is Important To Compete In General Search

986. Scale is vital for improving search quality. *Supra* ¶¶ 163–195 (§ III.E.1).

987. In search, increased scale fuels a feedback loop. Tr. 2644:20–2646:2 (Parakhin (Microsoft)); Tr. 1761:4–24 (Lehman (Google)) (discussing UPX0228 at -503). One step in the feedback loop is that more searches provide the GSE with more data, which improves search quality. The more users a GSE observes, the more it understands what good and bad results are. Tr. 2644:20–2646:2 (Parakhin (Microsoft)) ("Simply if you've seen -- if this query was issued previously and people already clicked on certain results and read them, and some results they click-click-click back, it gives you a lot of information which results are actually good or not, and you can memorize them."); UPX0228 at -503 ("The source of Google's magic is this two-way dialogue with users. With every query, we give a [sic] some knowledge, and get a little back. . . . After a few hundred billion rounds, we start lookin' pretty smart!").

988. Of note, Google can train key algorithms with an amount of data not available to its rivals. *Supra* ¶¶ 163–166. For example, one of Google's key algorithms, Navboost, makes use of all user-side data Google receives in 13 months. Tr. 1805:6–13 (Lehman (Google)); UPX0182 at -438 ("Navboost is one of the most successful algorithms in search quality. Without Navboost our quality will be fairly close to that of Yahoo. Navboost has single-handedly given us the quality lead we have over Yahoo."); Tr. 6433:15–6434:2 (Nayak (Google)) (13 months means "quite literally all of the data that Google has collected over 13 months."). To put this number into perspective, in 2020 Google's share of the general search market was 89.2%, whereas

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Bing's share was 5.5%; the ratios of those two numbers is 16.2. *Supra* ¶ 522. If the amount of user-side data Google receives is proportional to the number of queries it receives, it would take Bing 17 years and 7 months to collect the data Google sees in 13 months. Tr. 5792:15–5793:23 (Whinston (Pls. Expert)); Tr. 10350:8–10351:8 (Oard (Pls. Expert)) (using a market share number provided by Google's expert and calculating "more than 13 years of data, two decades of data").

989. The greater volume of user-side data also allows Google to increase its search quality by helping identify areas for potential improvement and development. Des. Tr. 153:4–154:13 (Google-PN 30(b)(6) Dep.) ("[O]ften we look at queries that have [a low quality metric score] to try and understand what is going on, what are we missing . . . . So that's a way of figuring out how we can improve our algorithms."); Tr. 2257:11–15 (Giannandrea (Apple)) (The more queries a search engine sees, "the more opportunities the engineers have to look for patterns and improve the algorithm."). *Supra* ¶¶ 196–199 (§ III.E.2).

990. Prof. Whinston's empirical analysis supports the conclusion that greater scale improves search quality. Both Google and Bing have higher quality results for head queries (queries seen more frequently), as compared to tail queries. Tr. 5795:4–5796:15 (Whinston (Pls. Expert)) (referencing UPXD104 at 50). Prof Whinston's analysis showed the gap between Google's and Bing's respective quality scores are larger for tail queries than for head queries. *Id.*

991. Prof. Whinston also analyzed how long a user stayed on results pages after clicking; this also supported the conclusion that greater scale improves search quality. Tr. 5797:3–5798:15 (Whinston (Pls. Expert)). One measure Google uses for a search result page's quality is the length of time that a user spends on a search-result website. UPX0007 at -433. Google measures this by tracking the "click split," which is the ratio of long clicks to short

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clicks. UPX0007 at -433 ("'Click split' is . . . a proxy lately for goodness of outcomes per query."). A short click, i.e., the user clicks on the search result link and reverts back to Google quickly, indicates bad quality, and a long click indicates high quality. Tr. 5797:3–5798:15 (Whinston (Pls. Expert)); UPX0007 at -433. A comparison of the click split for Google's responses to head, torso, and tail queries found that head queries had a better click split (more long clicks) than torso queries, and torso queries had a better click split than tail queries. Tr. 5797:3–5798:15 (Whinston (Pls. Expert)). This analysis shows that Google serves better search results for queries that it sees more frequently, as compared to queries it sees less often. *Id.*

992. Increased search quality will attract users and advertisers (who follow users) resulting in increased advertising revenue, which increases resources available for investment. Increased investment, in turn, indirectly and directly leads to greater scale (through revenue used for distribution) and search quality (through investments in search). This in turn attracts more users and leads to greater scale, in a flywheel that continuously spins. Tr. 2652:2–14, 2653:2–2654:5, 2654:20–2655:13 (Parakhin (Microsoft)); *infra* ¶ 1054.

993. Because of this scale-driven feedback loop, GSEs are greatly affected by how much scale they have compared to their rivals. Tr. 2646:7–22 (Parakhin (Microsoft)) (Relative traffic, for example, functions such that "if I have more traffic than my competitors, that participates in multiple feedback loops driving quality and driving index completeness, which in effect is driving quality. And not unimportant, it is very impactful for revenue."); Tr. 2652:2–2654:5, 2654:20–2655:13, 2681:25–2682:9 (Parakhin (Microsoft)) (Differences in relative scale create an asymmetry that also has a self-reinforcing component. If a GSE's "relative scale is larger, [its] quality is better so people are more likely to prefer [its] results, and advertisers are

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more willing to come to [it] so [it will] have more revenue, and so [it will] have more money to invest" and with more money to invest it can buy more distribution that increases its scale, and spend more on infrastructure and engineers that make its quality better.).

994. Consistent with the importance of scale, where a rival has sufficient scale, it may narrow the search-quality gap. For example, on desktop, with its ownership of the Windows operating system, Bing (including partners) has recently served about 13–25% of the *desktop* search market. Tr. 2662:20–2663:1 (Parakhin (Microsoft)); Tr. 3495:16–20 (Nadella (Microsoft)). As a result of its scale on desktop, Bing has narrowed the search quality gap on desktop. UPX0238 at -667 ("Overall, Google leads other search engines. However, Bing is comparable on desktop."). Google's and Apple's evaluations found that in certain areas, Bing outperforms Google on desktop. UPX0238 at -679–80; UPX0260 at -681 (Apple evaluation found that "Bing in English (US) Desktop is actually preferred" to Google.); UPX0187 at -713 (Because Bing does not "have scale in queries they are not good in the long tail yet" even though "[f]or the head part of mainstream queries they have narrowed the gap.").

i. Access To Tail Scale Is Necessary To Compete In General Search

995. Scale depth cannot substitute for scale breadth. Search quality depends on having a sufficient volume of queries and a sufficient variety of queries rather than more instances of the same query. *Supra* ¶¶ 980–983. For example, having more head queries does not allow a search engine to optimize tail queries. Des. Tr. 151:20–152:16 (Google-PN 30(b)(6) Dep.) (more queries generally do not help address tail queries if the additional queries are all head queries); Des. Tr. 93:18–25 (van der Kooi (Microsoft) Dep.) (Microsoft has not reached parity with Google for tail queries because they do not show up with the same frequency.); Tr. 1902:8–19 (Lehman (Google)) ("[F]or these head queries that we've seen many times and for which we

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have [click data], we're more confident in that boost data . . . as for queries that are in the long-tail where we have little scraps of data, it's ambiguous, it's harder to figure out.").

996. Tail queries particularly benefit from additional scale because these queries are not frequently observed by GSEs. Tr. 2675:14–24 (Parakhin (Microsoft)) (less frequent queries like tail or location-specific queries tend to benefit more from scale); UPX1079 at -996 ("[T]he vast number of queries we see rarely or even just once [are] the tail [queries]."); Tr. 10343:2–10345:9 (Oard (Pls. Expert)) ("And so it follows exactly what you would expect, that the long tail queries are where user-side data can be particularly valuable, because if I have a head query, a query that's occurring very often . . . then I don't have to have a whole lot of user-side data before I've seen a lot of [that head query]. And if I see a lot more [of that head query] I'm not probably going to get a whole lot better. But if I'm seeing zero or 20, there's a big difference."). Google's scale at the tail allows it to improve its tail quality as compared to rivals "because at [Google's] scale, even the most obscure choice would have been exercised by thousands of people." UPX0205 at -202.

997. A GSE's ability to respond to tail queries is important to its ability to attract and retain users. Tr. 2251:24–2252:13 (Giannandrea (Apple)) ("[T]he tail requirement is pretty onerous" because users "would become suspicious if they knew something existed and they couldn't find it . . . ."); Des. Tr. 249:12–250:15 (van der Kooi (Microsoft) Dep.) (Tail quality is important because a "consumer . . . is most loyal to a product where all their needs are being met. So they care about the head and the torso, but they certainly care about the quality on tail queries as well because that is where they have local leads, et cetera.").

ii. Access To Mobile Scale Is Necessary To Compete In General Search

998. Mobile scale is necessary to improve the quality of mobile search and compete in general search. Tr. 3495:23–3496:16 (Nadella (Microsoft)) (User quality for search requires

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participation in both desktop and mobile.); Tr. 2260:22–25 (Giannandrea (Apple)) (differences between mobile and desktop make access to mobile queries at scale important to search quality on mobile); Tr. 2765:5–22 (Parakhin (Microsoft)) (Scale on a particular form factor allows you to optimize to that form factor.).

999. The user-side data GSEs obtain from mobile users is markedly different from the user-side data the GSEs obtain from desktop users. Tr. 2663:7–2664:6 (Parakhin (Microsoft)); UPX0262 at -990 ("[W]e found user search intent and interaction patterns on mobile are substantially different from the patterns on desktop . . . .").

1000. First, the query mix between mobile and desktop is different. Tr. 2260:19–21 (Giannandrea (Apple)). For example, desktop and laptop users tend to research things (like a new mortgage) that take more time. Tr. 2650:3–19 (Parakhin (Microsoft)). In contrast, mobile users are more likely to quickly search for things needed in the moment, like restaurants. *Id.* Another important difference between desktop and mobile users is that mobile users tend to issue more local queries. Des. Tr. 80:18–82:15 (Google-PN 30(b)(6) Dep.); Tr. 2661:5–8 (Parakhin (Microsoft)); Des. Tr. 249:10–250:15 (van der Kooi (Microsoft) Dep.) ("[O]n a mobile device there is a larger percentage of those local and tail queries."). A local query is defined as one where the results vary depending on the location of the user. Tr. 2660:18–2661:4 (Parakhin (Microsoft)) ("So, for example, querying President of the United States is the same -- the result will be [the] same no matter where you are in the world whereas best restaurant near me would be very different depending on where you are in the world."); Tr. 222:14–15 (Varian (Google)) ("A local query would be a query of a local store or merchant, geographically local.").

1001. Moreover, because of the on-the-go nature of mobile devices, local queries on mobile tend to be more varied and fine-grained. Tr. 2660:1–17 (Parakhin (Microsoft)) ("On

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desktop, the location information [is] either unavailable or is much coarser or granular, right, because most laptops or desktops don't have GPS or fine-grained location information."); Tr. 3506:22–3507:12 (Nadella (Microsoft)) (Without mobile scale, a GSE would not "get the local restaurant" that it "didn't see on the desktop."). Because local queries seek very specific location-dependent information, they tend to be tail queries. Tr. 2771:14–2772:15 (Parakhin (Microsoft)) ("[F]or certain locations, popular locations . . . like New York City, it would be [a] head query . . . . [I]f you're querying it from less popular locations somewhere in the field, like, nobody ever might have queried in that area ever" it would be a tail query.); *id.* 2661:13–16 ("It's much more likely that the local query will be [a] tail query."); Tr. 10346:20–10349:14 (Oard (Pls Expert)).

1002. Second, user intent on mobile and desktop differs even when the user issues that same query. Tr. 6315:24–6317:16 (Nayak (Google)) (for the same queries, mobile users sometimes have different intents than desktop users); Des. Tr. 80:18–82:15 (Google-PN 30(b)(6) Dep.). For example, a Google-conducted study observed that for the query "norton pub," "desktop users meant 'Norton Publishing' company, whereas mobile users wanted to find a pub named 'norton.'" UPX1087 at -723. Within mobile, GSEs observe a wider variety of user intents based on the user's specific location. Tr. 2772:20–2773:16 (Parakhin (Microsoft)) ("You know, the word Eiffel Tower, if you're in Paris would mean Eiffel Tower. If you're somewhere else, it might mean like local attraction, Las Vegas Eiffel Tower or, again, [a] restaurant with the same name . . . .").

1003. Third, users interact with mobile and desktop results differently, producing different data. UPX0201 at -211 ("Mobile gets a different aspect of user behavior."); Des. Tr. 80:18–82:15 (Google-PN 30(b)(6) Dep.). As compared to desktop users, mobile users tend to

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interact with results using "non-click" type feedback (i.e., hovers, scrolls, quickly "abandoning" results they are satisfied with). UPX1087 at -720, -733; UPX0262 at -991 (With the dawn of the "mobile era" it became important to track "abandonment (query event which is followed by neither clicks nor manual query refinement) and attention signals measuring how long the user spent on a result," so that they "could be employed as important non-click signals that can be positive indicators for results providing answers.").

1004. GSEs—which rely on patterns derived from user-side data to improve search quality—derive different conclusions from observing mobile versus desktop user-side data. Mobile scale is particularly important to be able to serve high quality results in response to the local queries that are only seen on mobile devices. Because by observing user behavior in relation to their location, GSEs learn when users seek different information. Tr. 2660:1–17 (Parakhin (Microsoft)) ("So it's very important to have as much mobile traffic as possible to be able to answer queries that are very location-specific."); Tr. 10346:20–10349:14 (Oard (Pls. Expert)) ("But fine-grain location has value for serving user needs if I know what other people in that region have looked for."); Tr. 10419:1–19 (Oard (Pls Expert)) (For "finer grained location[s]" GSEs "would need even more user-side data to train features of this type."); Des. Tr. 202:13–203:6 (Edwards (Google) Dep.); Des. Tr. 133:17–134:12 (Google-PN (30(b)(6) Dep.) ("[W]e use your location if you should share it with us to retrieve results that are nearby. That proves to be incredibly valuable, also."). Thus, scale from desktop is not a substitute for mobile scale. Tr. 2663:4–2664:6 (Parakhin (Microsoft)) ("[Y]ou cannot easily sort of leverage data in one form factor to easily improve quality in another."); UPX0259 at .004 ("We can't always port over products as is from mobile [to desktop].").

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1005. Consistent with the importance of scale, Google has a quality advantage in mobile where it has a marked scale advantage as compared to its competitors. UPX0268 at -132–33 (finding based on a Google-conducted 2020 comparative analysis that "[a]cross the board, Google outperforms more on mobile than desktop"). *Supra* ¶ 979.

iii. Rivals Are Deprived Of Sufficient Fresh Scale To Compete

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1007. Fresh queries (at scale) are important for a GSE to provide useful responses to queries, as the meaning of search queries and search results change over time. Tr. 10337:12–10339:6 (Oard (Pls. Expert)) (By observing users, Google learns that words have new meanings based on new events.); Tr. 1899:25–1902:4 (Lehman (Google)) ("[O]ld school techniques" that train on fresh user-side data are used to keep up with current events.); Tr. 2369:2–7 (Giannandrea (Apple)).

1008. As such, GSEs require fresh data to respond to fresh-seeking queries. For example, Google deploys "instant" systems that (1) log fresh user-side data and (2) improve search quality by promoting fresh results for fresh-seeking queries. DX0116 at -.027 ("Instant Glue will suppress" stale results); UPX1006 at -192 ("Instant Navboost" accounts "[f]or popular queries over the last 24 hours [redacted]."); Tr. 10336:18–10337:11 (Oard (Pls. Expert)) ("Instant Glue is only looking at the last 24 hours of logs. And because of that, the processing can be faster. And so that allows them to get updates available to the search engine in something on the order of 10 minutes."). Google's "fast response system . . . tries to make use of [new clicks] as quickly as possible." Tr. 1901:12–1902:4 (Lehman (Google)).

1009. Similarly, to serve fresh results, Google must regularly (in 2–3 month intervals) retrain deep-learning systems using fresh data. Tr. 6432:8–25 (Nayak (Google)) (Google trains RankBrain with fresh data at a regular cadence, because otherwise it would be blind to new

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events); Tr. 6448:20–6449:3 (Nayak (Google)) (Google must retrain RankEmbedBERT so that the training data reflects fresh events). Failure to retrain Google's deep-learning systems would result in a degradation of the quality of those systems because they would become "stale," decreasing Google's search quality. Des. Tr. 119:20–121:6 (Google-PN 30(b)(6) Dep.) (It is important to retrain deep-learning models at a regular cadence because fresh user-side data improves the performance of those models.); *id.* ("But once you retrain and you get this thing when you get a bump up in quality back to where it was before, because now you have got the fresher data and then, again, you see this steady decline.").

1010. A search engine's ability to accumulate data over time does not replace the need for fresh data at scale. Tr. 10350:8–10351:8 (Oard (Pls. Expert)) (Google ranking systems use as much as 13 months of user-side data. It would take Bing years to get the same quantity of data, and by that point, the data's lack of freshness would make it not useful for training ranking systems.).

b) Rivals Lack Access To Sufficient Scale To Fuel Their Development Cycle

1011. GSEs run experiments to ensure system changes improve system quality; these experiments thus facilitate improvements. *Supra* ¶¶ 197–198. GSEs use various metrics to evaluate search results, including metrics based on human-rater evaluations and live evaluations. Human-rater evaluations are experiments done with a pool of hired reviewers. UPX0872 at -848. Live experiments are conducted on real users of the live GSE. *Id.* at -849. Using multiple metrics allows the GSE to assess different aspects of search quality. Tr. 1786:11–16 (Lehman (Google)) (Human rater and live experiment metrics "provide two different perspectives on search quality . . . ."); UPX0204 at -220 (discussing difference between rater-based and user-based evaluation).

1012. Scale substantially increases a GSE's ability to perform live experiments. Des. Tr. 92:13–93:10 (Jain (Google) Dep.) ("Google has such a high volume of users, you can get to

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statistical significance very quickly."). Google uses its scale to continuously run live experiments and improve its search engine. UPX0870 at -.015 ("Every time you use Google Search, you participate in a number of experiments to test how users interact with new features or algorithms. Every search request you make usually hits experimental code."); Tr. 2315:15–2316:1 (Giannandrea (Apple)) (agreeing that Google typically runs "thousands" of "live experiments" for "proposed improvements to its search product"). Google runs so many experiments that even at its scale, it "can run out [of] data easily." UPX1059 at -304.

1013. Because human-rater evaluations are blind to some aspects of search quality, human-rater evaluations do not replace the need for scale to run live experiments. Tr. 1779:13–20 (Lehman (Google)) (Human-rater evaluations capture many aspects of search quality, "but it can't get quite all of them."); UPX0204 at -223–25 (listing shortcomings of human rater evaluations including "[r]aters may not understand technical queries" and "[r]aters cannot accurately judge the popularity of anything"); UPX0872 at -848–49 ("[H]uman eval metrics have many limitations: raters are not users and may not be able to represent the user & rating data quality is a concern."); Tr. 10326:8–10328:2 (Oard (Pls. Expert)) (describing aspects of search quality that human raters are not good at measuring).

1014. Because of the limitations of human rater evaluations, Google regularly uses live experiments as a measurement of "ground truth" for how real users are responding to changes. UPX0213 at -720 ("Limits on rater-based evaluation force us to take decisions based heavily on live experiments. . ."); Tr. 9039:24–9040:6 (Fitzpatrick (Google)) ("We often can learn a lot more once a product or feature is out in the wild, seeing usage at scale, than we can just when we're testing in a lab or with a handful of people."). Because live experiments provide an important and unique measurement of search quality, Google typically does not launch a change

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to its systems without running a live experiment. Tr. 2315:15–2316:4 (Giannandrea (Apple)) (Google did not "typically" make a change to its algorithm without a live experiment.); DX0080 at -743 ("All Ranking experiments run [Live Experiments] (if possible).").

1015. Without access to sufficient mobile traffic, Google's rivals cannot run live experiments (or are unable to run as many live experiments as would be optimal) to improve their search products. Des. Tr. 146:23–149:3 (Ribas (Microsoft) Dep.) (Bing cannot run as many experiments on mobile because it does not have the necessary scale.).

3. The Effects Of Scale On Search Quality Are Uniquely Important

a) Investments In Non-Scale Methods Of Improving Search Quality Do Not Mitigate The Need For Scale

1016. There are both scale and non-scale dependent ways to improve a GSE's search quality. Tr. 2664:11–2664:18 (Parakhin (Microsoft)) ("[Q]uality is an aggregate term. It, of course, requires certain components that are scale-dependent, and, of course, also requires certain components that are not scale-dependent . . . . ."); UPX1058 at -311 (2009 Microsoft document detailing the scale and non-scale gap between Bing and Google). Scale, however, can affect the search engine's performance in unique ways—even aspects of search quality that might not initially seem scale dependent. Tr. 2664:19–2665:11 (Parakhin (Microsoft)). For example, the speed of serving results—i.e., latency—depends on scale "because the higher the scale you have, the more likely it is that [a] query was issued that isn't in [the] cache. And so in the cache somewhere closer to the user, you will have [a] higher density of end points." *Id.*

1017. The effect of scale on search quality cannot be mitigated by non-scale factors such as additional investments in engineering headcount and machine learning. For example, engineering headcount is important "up to a point" but then around 2,000 to 3,000 engineers "it hits diminishing returns." Tr. 2665:12–23 (Parakhin (Microsoft)) (explaining that this is why

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"companies like Yandex, [Naver] in Korea -- successful Korean search company or Bing all have roughly the same sized teams."); *id.* 2666:21–2667:12 ("But without scale, even the best engineering has proven, at least empirically, to be virtually powerless."). Similarly, further investment in machine learning can help but "empirically, even significant improvement in algorithms does not tend to outweigh [the] importance of scale." Tr. 2665:24–2666:11 (Parakhin (Microsoft)) ("If you don't have scale, you can to a certain degree try to mitigate it by trying to be smarter and running more sophisticated machine learning algorithms. It will give you some way forward, which is why Bing very quickly embraced machine learning and was fully machine learning-based even in early -- or late 2000s. It's not a substitution or a solution, it can be mitigation.").

1018. Using publicly available data does not replace the need for scale from user-side data. Tr. 2763:9–24 (Parakhin (Microsoft)) ("[U]sing open data, using deep models, using better search algorithms, you can mitigate effects of scale to certain degree. We haven't seen like them being able to reverse effects of scale.").

1019. Further, click-based signals (including the absence of clicks) tend to be more important than non-click-based signals in terms of their effect on search quality. Tr. 2652:15–24 (Parakhin (Microsoft)); UPX0213 at -717, -722–23 (There are three primary signals used in ranking: body (the text of a document), anchors (links between documents) and clicks, which are by far the most important of the three); *id.* at -723 ("Exploiting user feedback, principally clicks, has been the major theme of ranking work in the past decade.").

1020. Scale, not techniques, is a key differentiator in search quality, as Google recognizes and has recognized for a long time. UPX0856 at -345 ("Google's chief scientist Peter Norvig shared his view: We don't have better algorithms than anyone else. We just have more

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data."); UPX1055 at -621 ("[W]e tend to overestimate how great [Google's] techniques are, and under-estimate the effect of [our competitors] only seeing a fraction of [Google's] overall query stream, compounded over decades."). In a 2009 PowerPoint, Alan Eustace, then VP of Engineering at Google, wrote in a slide titled "The Power of Data" that "[a] ton of data is better than a[n] ounce of algorithm" and that "[s]ome simple methods that appear to fail with limited data can work well with enormous amounts of data." UPX0186 at .026. Dr. Nayak, Google's VP of Search, recognized the importance of data to serving results. Des. Tr. 179:6–180:11 (Google-PN 30(b)(6) Dep.) (if someone had all of Google's algorithms, but none of the data, the algorithms would not work).

1021. Data is also the key differentiator for deep-learning systems like Google's RankBrain. UPX0861 at -827 ("In reality, machine learning practitioners spend the most time investigating sources of training data, processing that data, cleaning it up, and so on. Training data is more important than architecture. Generally speaking, the more training data, the better. So, you should always look to exploit the largest sources of training data that you can find. Even if the training data is noisy, as is the case with user click data used for RankBrain, the large volume of it . . . can help us extract some signal despite the noise.").

b) Technological Improvements, Like Generative AI, Have Not Replaced The Need For Scale

1022. Generative AI (including large language model chatbots) performs a different function than traditional GSEs. "AI [lets] you do . . . things like summarization, presenting a single answer in ways that, honestly, search engines of old could not do." Tr. 3696:15–3697:21 (Ramaswamy (Neeva)). "[F]iguring out what are the most relevant pages for a given query in a given context still benefits enormously from query click information. And it's absolutely not the case that AI models eliminate that need or supplant that need." Tr. 3696:15–3697:21

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(Ramaswamy (Neeva)); Tr. 8287:3–5 (Reid (Google)) ("[V]ery much agree[s]" "that Bard is not the same as Google search."); Tr. 8288:14–19 (Reid (Google)) (agreeing that "Bard is really separate from search").

1023. Google and Bing's Generative AI tools, like Bard, Search Generative Experience, and Bing Chat, synthesize the results of their respective traditional search systems. (Parakhin (Microsoft)) Tr. 2670:19–2671:9 (Parakhin (Microsoft)) ("The large language model [in Bing Chat] is used for reasoning and for providing the answer, but the base information is coming from search."); *id.* 2670:10–18 (Bing Chat marries the functionality of ChatGPT and Bing); Tr. 8331:18–24 (Reid (Google)) (Google relies on the search index to verify or confirm Search Generative Experience (AI) responses against the results that it gets from Google search).

1024. Thus, because they rely on traditional search results, these systems, do not eliminate the need for scale. Tr. 2669:20–2670:2 (Parakhin (Microsoft)).

1025. Generative AI technology is still a nascent technology. *Supra* ¶ 393. It is still error prone and can produce inaccurate, out-of-date information. Tr. 8285:17–19, Tr. 8276:10–24 (Reid (Google)) ("[T]he technology is very nascent. It makes mistakes."); UPX2068 at -454 ("There are known limitations with generative AI and [large language models], and search, even today, will not always get it right."); *Supra* ¶ 394.

1026. Generative AI large language models are expensive to train both in terms of cost and time as compared to traditional search systems. Tr. 8278:12–18 (Reid (Google)) (Large language models are "definitely expensive to retrain"); *id.* 8281:17–24 (Language models require a large amount of computer power to "build a base foundation model," making them "expensive to train."); Tr. 6452:1–6 (Nayak (Google)) (Training and running AI models can be energy

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consumptive because of the computation required.); Tr. 6452:9–24 (Nayak (Google)) (AI Models such as MUM can be more expensive than core systems.).

1027. Generative AI models will not replace traditional search. Tr. 7528:25–7530:8 (Raghavan (Google)) (does not believe that in 10 years people will be doing everything through chatbots and large language models); *id.* 7530:25–7531:8 (discussing UPX2040 at -299 that AI through chatbots and large language models have not created a whole new world and caused the old world to go away).

1028. [INTENTIONALLY LEFT BLANK]

1029. As with self-driving cars, which may perform acceptably under controlled conditions but substantially worse in real-world conditions, a search engine based solely on large language models (without access to a traditional search system or user-side data) may be useful and perform well for certain categories of queries but could not be used to build a competitive fully functioning search engine. Tr. 2763:25–2765:2 (Parakhin (Microsoft)).

4. Scale Impacts Advertiser Participation And Search And Text Ads Relevance

1030. Scale affects the advertiser side of search in two ways: (1) scale drives advertiser participation on a GSE's platform and (2) scale improves a GSE's ability to show relevant ads and increase ad click-through rates. Tr. 5828:1–20 (Whinston (Pls. Expert)) (referencing UPXD104 at 55).

1031. As with general search, Google enjoys a massive scale advantage in Search Ads—particularly Text Ads, which Google targets using keywords and prices through a stand-alone auction and matching system. Google's market share is overwhelming in both Text Ads—over 80% since 2016 and 88% in 2020—and in Search Ads as a whole—a little below 65% since 2012 and 74% in 2020. Tr. 4777:24–4778:15, 4779:7–15 (Whinston (Pls. Expert)) (referencing UPXD102 at 62–63). This advantage becomes even greater on mobile, where Google has an

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even greater share of Search Ads, especially in Text Ads, due to its 94.9% market share in mobile general search queries. *Supra* ¶ 525.

1032. Advertisers allocate the vast majority of their paid search spend to Google. Tr. 5141:19–5142:13 (Booth (The Home Depot)) (The Home Depot allocates an "industry standard" 90% of its paid search spend to Google versus about 10% to Bing because "Google has more search volume" and more auctions.); UPX0841 at -460 (Microsoft's analysis in 2018 noted that Bing does not have "about [redacted]% of the advertiser domains that [it] observes in Google's ad clicks."); *supra* ¶ 588.

1033. Improving the quality of a GSE's Search Ads (including Text Ads) increases the overall search experience, meaning Google's scale advantage in Search Ads reinforces its scale advantage in general search. Tr. 4194:14–4195:25, 4234:11–4235:4 (Juda (Google)) ("[I]mproving the quality of the ads that a user sees is more likely to help them achieve whatever their search goal is, sort of more quickly, more effectively . . . ."); Tr. 1328:14–1329:6 (Dischler (Google)) ("[W]e believe that it's an actually worse user experience to not have ads on the page.").

1034. For Search Ads, to train its machine learning models and improve the accuracy of matching Search Ads to queries, Google relies on both observed behavior from actual users as well as data from paid raters. Tr. 4199:17–22 (Juda (Google)) (Google's machine learning models for predicted click-through rate are "grounded on actual user activity."); Tr. 1789:1–3 (Lehman (Google)) (Technologies developed in search with user data benefit other parts of Google, including Search Ads; referring to UPX0219 at -426); UPX0454 at -644 ("Today we rely on observed user behavior (e.g. whether a user clicked on an ad and stayed on the page for a

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long time) as well as ad evaluations from a paid pool of trained raters to train our ML models and evaluate our experiments").

a) Google And Other GSEs Rely On User Data From Scale To Increase Ad Clicks

1035. As described in more detail, *supra* ¶¶ 140–145, when a user performs a search, Google and other GSEs run multiple auctions between relevant ads to determine (1) which ads (if any) will appear on the SERP, (2) the order they will appear, and (3) the CPC of each ad. Tr. 4010:17–4012:5 (Juda (Google)) (discussing UPX0842 at -000); UPX0010 at -054–57, -064–66 (describing the series of auctions to fill each ad slot on the SERP and what inputs they use). For every ad in every auction, Google calculates an LTV, which relies not just on the bid but also on a complex algorithm assessing the ad's quality, i.e., long-term value to Google. Tr. 4248:12–4249:4 (Juda (Google)). As described in greater detail in, s*upra* ¶ 641; to calculate LTV (also known as Ad Rank), Google's systems produce three predictions for each ad: the predicted click-through rate (pCTR), the predicted quality of the ad's landing page (pLQ), and the predicted quality of the ad copy itself (pCQ). UPX0010 at -054–57 (explaining components of LTV); UPX6027 at -567 (written 30(b)(6) response: identifying "primary predictions" used in ad auction—likelihood of a click, quality of the ad copy, and quality of the advertiser's landing page); UPX6058 at -002–04 (Google Ads Help: "About ad position and Ad Rank").

1036. Google runs billions of auctions and displays billons of Search Ads per day. Tr. 1198:24–1199:5 (Dischler (Google)). The company relies on this massive scale to train the components of its LTV algorithms, which benefit from Google's scale advantage.

1037. Google describes pCTR as the "most important quality metric" within its LTV algorithm. UPX0010 at -059–60. Google trains its systems to predict click-through rates by observing its user's reactions to the ads it displays. Thus, Google's pCTR algorithm relies on

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user-side data. UPX6027 at -566–67 (written 30(b)(6) response: "Google's predicted click-through rate (pCTR) machine-learning model uses query and click data."); Tr. 8878:17–8879:1 (Israel (Def. Expert)) ("[T]he PCTR score rel[ies] on clicks."); Tr. 4199:17–22 (Juda (Google)) (Google's pCTR models "are grounded on actual user activity."); UPX0231 at -978 (Internal Google email discussing serving ads to DuckDuckGo users: Click data is "a *huge* quality signal" to ensure a good user experience, and it is "rather important" because Google can "see to what extent in practice [DuckDuckGo's] CTRs are much lower than what we would expect" by comparing them to other search partners.); UPX0010 at -059 ("Users vote with their clicks, and the more users click on a particular ad in response to particular queries, the more we learn the high-quality nature of the ad.").

1038. Components of Google's pCTR algorithm train on quantities of data that far exceed that possessed by Google's rivals. Tr. 8879:9–8880:24 (Israel (Def. Expert)) (At least one component of pCTR model uses 12 months of data.); *id.* 8881:2–9 (According to Dr. Israel, Google's volume of queries compared to its rivals show how much more data it has compared to its rivals.).

1039. PLQ is another critical component of Google's Ad Rank algorithm. It predicts the quality of an ad's landing page, which is the page a user arrives at after clicking on the Search Ad (usually a related page on the advertisers' web site). Tr. 4248:12–4249:4 (Juda (Google)); UPX0010 at -061–62.

1040. GSEs rely on user-side data in assessing landing page quality by assessing whether a users' pattern of interactions with the GSE before and after an ad click is consistent with high or low-quality ads. Tr. 10281:14–10282:8 (Oard (Pls. Expert)) (User-side data is used to estimate landing page quality.); UPX0021 at -376.003–06. Google is no different: its pLQ

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algorithm predicts landing page quality using a model trained on user log data. UPX0021 at -376.003–06 (adopting pLQ measure based on sampled click data from user logs to estimate quality based on "the pattern of user interactions before and after the ad click").

1041. Significantly, Google made the decision to train its current pLQ model on user log data only after determining alternatives were inadequate to model pLQ. In 2017, Google implemented the "Eagle Lunar Module" launch, which (1) abandoned training pLQ models using human-rater analysis of scraped ad/click data and (2) adopted, instead, a model relying on sampled ad clicks. UPX0021 at -376.003, -376.006–07. With the Eagle Lunar Module launch, Google identified multiple benefits from switching to user logs data, including that "logs data has large scale and richness" and that actual user logs data enables directly measuring serving accuracy at scale. UPX0021 at -376.007; UPX0248 at -279. Thus, Eagle Lunar Module opened the door to a "[h]uge amount of training data," increasing the data "from [redacted] (query, ad) to potentially [redacted] over a year." UPX0021 at -376.011.

b) Empirical Evidence Shows The Value Of Scale To Ad Predictions

1042. Empirical analysis shows click-through rates (CTRs) are higher for ads accompanying more popular queries, indicating scale helps search engines serve ads likely to receive clicks.

1043. Prof. Whinston analyzed Bing's and Google's CTRs for top-slot, first-position Text Ads on both mobile phones and desktop and reached two conclusions based on how CTRs changed with the frequency of the query and the comparison of Bing's and Google's CTRs. Tr. 5831:15–5834:16 (Whinston (Pls. Expert)) (referencing UPXD104 at 58). Looking at CTRs based on the frequency of the query, the analysis showed that, for more frequently seen queries, both Google's and Bing's CTRs are higher. *Id.*; UPX1058 at -328 (In a review of search monetization, Microsoft noted, "[m]any more phrases may lack sufficient scale on Yahoo and

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Microsoft than Google."). Comparing CTRs on desktop and mobile, the analysis showed that Bing's CTRs were higher than Google's on desktop, but lower than Google's on mobile phones. Tr. 5831:15–5834:16 (Whinston (Pls. Expert)) (referencing UPXD104 at 58). Bing has significantly more scale on desktop than on mobile, and this analysis shows that where Bing has decent scale—on desktop—it does well. *Id.* "[W]here Bing has no scale at all"—on mobile—it is "much worse." *Id.*

1044. In a second analysis, Prof. Whinston compared users' click splits (i.e., the number of users quickly returning to Google after clicking on an ad compared to those that do not return quickly, *supra* ¶ 991, for Search Ads served in response to head, torso, and tail queries. Tr. 5797:3–5798:15 (Whinston (Pls. Expert)). Prof. Whinston observed worse click splits (meaning the user returned more quickly) for ads on tail queries than for those on torso queries, and worse click splits for ads on torso queries than for those on head queries. *Id.* Google commonly uses click splits as a measure of quality for both ads and organic results. *Id.*; *supra* ¶ 991. Prof. Whinston's analysis shows that the quality of the Search Ads Google returns is worse for queries Google sees less often and better for those it sees more often.

1045. These three conclusions from these two analyses mirror the results of Prof. Whinston's analyses of search quality. *Supra* ¶¶ 990–991

c) Greater Relative Scale Benefits Monetization And Ad Quality

1046. A GSE's relative scale—its scale relative to its competitors—increases its ability to monetize its advertising inventory in at least two ways: by increasing the pool of available relevant ads and by increasing auction pressure.

i. Greater Scale Increases The Pool Of Relevant Ads

1047. First, the greater a search engine's scale, the greater the number of advertisers interested in placing ads on the search engine. UPX0244 at .004 ("[S]mall increases in scale

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meaningfully improve advertiser participation, making it possible to offset fixed cost of investing in another platform."); UPX1058 at -328 ("Volume scale drives *long-run* advertiser behavior."). There are costs associated with participating on an ad platform and if a platform has fewer ad opportunities, the benefits of participating may not outweigh the costs. Tr. 5828:21–5829:7 (Whinston (Pls. Expert)); UPX0244 at .004; UPX1058 at -328 ("Advertisers maximize ROI through volume by comparing profits on each platform to fixed costs of entering a platform and ongoing costs of monitoring a campaign."). Advertisers thus focus on the market leader when placing Search Ads. *Supra* ¶¶ 587–588.

1048. An analysis of queries and advertisers on Google (from 2010–2021) found that as the number of queries went up the number of advertisers also went up. Tr. 5829:23–5830:12 (Whinston (Pls. Expert)) (referencing UPXD104 at 56).

1049. Greater advertiser participation increases the pool of potentially relevant ads for each query, which increases the chance the GSE can present a relevant ad to a query. Tr. 2653:2–13 (Parakhin (Microsoft)) (With more scale, "you'll have more advertisers, so you'll have a high selection of ads, so you'll have more to choose from, so you will pick up better ads."); Des. Tr. 50:6–51:2 (van der Kooi (Microsoft) Dep.) ("[S]cale drives not only the scale of users, [it] drives how many advertisers are willing to participate in the market."); Tr. 5828:1–20 (Whinston (Pls. Expert)) ("[S]cale drives advertiser participation . . . on a general search engine platform and that's going to be important for monetization. . . . And then second, scale improves a general search engine's ability to show relevant ads and increase ad click-through rates . . .").

1050. The greater pool of ads conferred by relative scale is particularly important for tail and local ads. Des. Tr. 55:20–56:23 (van der Kooi (Microsoft) Dep.) ("[O]f the very important tail [of advertisers], we have only a small minority of advertisers. And that makes -- that is the

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biggest scale gap that we refer to, is indeed with tail advertisers that are crucially important when users type in queries that are more local."); DX0504 at -871 ("Google has more ad coverage and depth in the lower torso and tail because of their demand strength.").

1051. Some advertisers prefer to have their Search Ads appear only on desktop and some prefer to have their Search Ads appear only on mobile; greater scale on desktop does not attract advertisers interested only in advertising on mobile and vice versa. Tr. 2686:14–19 (Parakhin (Microsoft)); *id*. 2650:3–19 (Because user queries vary depending on the form factor (device), different advertisers prefer to advertise on different form factors, "whether it's a desktop ad or mobile ad is very much significant for advertisers."); UPX0117 at -001 (Search Ad dollars are shifting to mobile and Microsoft's lack of mobile presence will put PC monetization at risk.); UPX1005 at -183 ("Mobile and Audience targeting represent 2 of the largest growth opportunities in Search Ads today.").

ii. Greater Relative Scale Increases Auction Pressure And Monetization

1052. Second, increases in the pool of ads increases the number of ads competing for individual ad slots, thickening auctions. This increases revenue: as Google acknowledges, the more bidders in an auction, the greater the prices generated by that auction. *Supra* ¶ 622.

1053. The increases in auction pressure conferred by relative scale have a more-than-linear effect on revenue, generating increasing returns. A search engine with twice the scale of its competitors will generate more than twice as much revenue as the competitor. Tr. 2646:7–22 (Parakhin (Microsoft)) (Relative traffic "is very impactful for revenue. Revenue in search -- in advertising in general is nonlinear: If you're twice as big as your opponent, you will make four times as much money. Not exactly these numbers, but I'm just trying to illustrate the concept of nonlinearity."); *id.* 2683:25–2684:18 (The relationship between relative scale and a search

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engine's ability to generate revenue through Search Ads is "strongly nonlinear" because relative scale increases both number of clicks and makes each click more expensive.).

d) Scale Is Critical For The Search Ad Development Process, Including Conducting Experiments On Potential Launches

1054. Having more users and queries attracts more advertisers, which increases the speed and ability to make improvements to an advertising platform. Des. Tr. 50:6–51:2 (van der Kooi (Microsoft) Dep.) ("[I]f there is more users, more advertisers will follow. If there is more users . . . the data and the ability to make improvements in the platform, the speed at which that happens happens faster and, thereby, the product improves at a faster clip."); *id*. 90:14–22 (describing "the flywheel": "[M]ore users bring more advertisers, bring more product improvements, more quickly that, then, in turn, bring in more users."); Tr. 2648:24–2649:10, 2650:20–24, 2652:2–14 (Parakhin (Microsoft)) (The advertiser flywheel shows that more users bring more advertisers and better search quality, which leads to more relevant ads.).

1055. Google's process for ad launches involves multiple A/B experiments on steadily increasing levels of traffic. *Supra* ¶¶ 144–145 (§ III.C.3.b); UPX0889 at -787 (Google analyzes logs and advertiser experiments to evaluate pricing launches.). Google's massive scale enables it to get to statistical significance very quickly when conducting experiments on potential Search Ads launches. Des. Tr. 92:3–93:10 (Jain (Google) Dep.); *id.* 52:8–53:2 (describing Google's use of long-term live experiments used to measure ad "blindness," a metric for implementing Search Ads launches).

1056. These launches do more than just refine Google's existing technologies and algorithms; they also enable Google to develop entirely new technologies. Thus, broader advertiser participation helps firms to improve not just matches, but the underlying matching technology itself. UPX0234 at -120 ("[I]t is true that we make most of our money from a bunch

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of head advertisers, but the additional data we do need in order to, for example, improve our matching algorithms"). As with search, these improvements compound over time, exacerbating the effect of scale differences. *Supra* ¶ 199.

e) Google And Other GSEs Recognize The Benefits Of Scale To Search Ads

1057. Google and other GSEs recognize the benefits scale confers for Search Ads, including Text Ads. Des. Tr. 110:5–6, 110:8–11, 110:13–17 (Jain (Google) Dep.) (Increasing data relating to consumer activity is always valuable to Google, leading to better Search Ads and better organic results.); *id.* 66:18–67:15 (Google can "infer, based on pattern recognition" what ads are likely to be effective "across cohorts and large groups of people."); Tr. 2653:2–13 (Parakhin (Microsoft)) (More user interaction data improves ad relevance because "basically if you have more traffic and know more, then your ads will be better."); Tr. 2367:24–2368:8 (Giannandrea (Apple)) (User data helps with ad monetization because "[k]nowing what ads people want and which ones they click on is essential."); Des. Tr. 275:12–276:4 (Stein (IAC) Dep.) (Additional clicks and query data would allow Ask.com to better monetize its queries.); Des. Tr. 180:17–25 (Ribas (Microsoft) Dep.) ("[T]he ads quality was generally lower than the quality of the other elements of the page . . . because of the scale problem. If we didn't have scale, advertisers wouldn't come. If they wouldn't give us more ads, we couldn't have ads that were as relevant.").

1058. And Google recognizes the benefits of scale for Search Ads, even as it has publicly tried to suggest otherwise. In a 2009 email, Dr. Manber forwarded to Diane Tang a proposed blog post by Dr. Varian; Dr. Manbar wrote "he seems to be saying Ads Quality does not make good use of its data and does not need more. Is that true?" UPX0234 at -120. Ms. Tang responded to Dr. Manber, "no, it's not really true. hal doesn't really understand the ads serving system. ugh ugh ugh. it is true that we make most of our money from a bunch of head

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advertisers, but the additional data we do need in order to, for example, improve our matching algorithms. it's also a matter of what traffic we get vs. what yahoo gets. it's a massive over-simplification." *Id.* Ms. Tang separately forwarded the chain to Dr. Ramaswamy, stating "is it just me, or is what hal wrote a bunch of hooey?" UPX0233 at -828. Ramaswamy responded "it is probably factually incorrect. the more advertisers bid on things, the more chance that things like smartass [Smart Ad Selection System] will learn what works and what doesn't." *Id.*

1059. Google recognizes the importance of scale for ad quality and ad relevance. Tr. 5830:13–5831:1 (Whinston (Pls. Expert)) ("[A]n extract from an article -- scholarly article published by 16 Google employees that was titled, 'Ad Click Prediction, a View From the Trenches,' published in 2013 and it's just talking about . . . how difficult it is to predict what ad is a good, relevant ad for . . . a query. And . . . in bold you see here training data sets are enormous." (referring to UPXD104 at 57)); UPX0023 at -719 ("[S]martass machine learning looks at historical data for how ads are clicked and uses that – learning all the time; model that makes these prediction[s] almost instantaneous and refreshed hourly."); UPX0195 at -678 ("[I]n advertising the clicks of users continually generate more training data, and we end up with tens of petabytes of logs over a year or so so it'd be a huge waste of resources to train from scratch every time.").

1060. No alternate means exist for rivals to acquire the scale necessary to exceed Google's ad relevance. Des. Tr. 53:10–54:2 (van der Kooi (Microsoft) Dep.) ("[T]he ability to close the gap by bringing in ads from other ad platforms, . . . as a way to improve the advertising platform[,] is a very coarse and inadequate way of improving the advertising quality and advertising volume on the search engine. There is no substitute for actually having advertisers participate in the marketplace where they, as many advertisers do on an ongoing basis, optimize

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the keywords that they bid on, the ad copy that they create, [and] all of the ways that they tweak and manage search advertising on a daily basis.").

5. The Importance Of Scale Is Confirmed Through The Actions Of Market Participants

1061. Getting access to scale is particularly difficult on mobile because Apple and Android—both of which have committed all default scale to Google through exclusive arrangements—are the only two significant mobile distribution channels and effectively act as "gatekeepers" to mobile scale. Tr. 3102:12–3104:25, 3112:23–3113:20, 3276:16–3277:23 (Tinter (Microsoft)) ("it's very, very, very hard to achieve any quality scale"); Des. Tr. 96:16–23, 97:1–11 (Ramalingam (Yahoo) Dep.) (gaining distribution for Yahoo on mobile was "near impossible" because "there's Apple and Android" and both were tied up with Google contracts).

1062. Microsoft has pursued a partnership with Apple because such a deal would provide Bing mobile scale and allow Bing to "make additional fixed cost investments on . . . search relevance or search scale." Tr. 3502:3–20, 3503:9–16, 3508:6–18 (Nadella (Microsoft)); Tr. 2723:4–6 (Parakhin (Microsoft)) (a deal that gave Microsoft access to Apple's mobile traffic would be "game changing" and Microsoft would "invest more into mobile"); Des. Tr. 94:11–19 (Ribas (Microsoft) Dep.) (a distribution deal with Apple would increase Microsoft's incentives to invest in search); UPX0117 at -001 ("Scale benefits from bringing the Apple search volume into our marketplace are significant. . . . As search advertising dollars shift to mobile, lack of mobile presence will put PC monetization at risk. Apple partnership provides a foothold in the key mobile battleground."); DX0435 at -741 ("a strategic partnership with Apple, IMO, is the only viable option for us at this point" to gain share on mobile devices).

1063. For example, when Bing sought the Safari default in 2015 and 2016, *infra* ¶¶ 1263–1272, Bing's quality was a frequent topic of conversation with Apple; Microsoft told

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Apple that if Microsoft had more scale, "[Microsoft] could use that scale to rapidly improve the quality of Bing." Tr. 3252:13–3255:03 (Tinter (Microsoft)); Tr. 2509:23–2510:11 (Cue (Apple)); UPX0613 and UPX0614 at -122 (2015 cover email and presentation sent from Mr. Nadella to Mr. Cook stating "[t]he combination of the large search volumes on Apple devices with Microsoft's global search platform enables a high-quality search platform").

1064. Microsoft sent Apple a document "explain[ing] the economic model built by the Microsoft team to model the impact of increased scale in the Bing Ads marketplace from a search partnership with Apple," and stating that "[s]cale is crucial for delivering superior end user experience, publisher revenue, and advertiser ROI," "[m]ore scale leads to greater investments, and enables innovations at a faster pace," and "enables search engine[s] to offer a competitive product in all sides of the marketplace." UPX0246 at -259.

1065. Again, during negotiations in 2018, discussions between Microsoft and Apple included exploring the investments that Microsoft would need to make "to take advantage of the scale" it would receive if it entered a deal with Apple. Tr. 3255:09–3256:16 (Tinter (Microsoft)); UPX0797 at -022, -024–27 (In a presentation Microsoft sent to Apple, Microsoft explains how it would invest to improve its international search quality with added scale from Apple.).

1066. In 2018, Microsoft was willing to consider all the options when it came to Apple, even selling Bing to Apple, because, "in a world where scale matters tremendously to [a GSE's] ability to compete in mobile," Microsoft considered a potential deal with Apple to be the most compelling and "the one that justified the most creative thinking." Tr. 3276:16–3277:23 (Tinter (Microsoft)). According to Mr. Nadella, Microsoft was prepared to take billions in losses each year to obtain a distribution deal with Apple because gaining access to Apple's mobile scale had

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the long-term potential to make Bing, specifically, and search, generally, more competitive. Tr. 3501:5–3504:17 (Nadella (Microsoft)).

B. Google's Contracts Reduce Investment And Innovation Among Market Participants Including Google

1067. Market participants use a cost-benefit analysis when they think about search investments. Tr. 5838:13–5839:18 (Whinston (Pls. Expert)).

1068. When deciding whether to invest in improvements in search quality, Google compares the costs of investment to the benefits, such as likely returns in revenue or queries. UPX0891 at -884 ("The key proxy metric we will highlight for the purpose of this analysis is IS . . . . In 2019, finance estimated that a 0.1 IS metric gain may give approximately [redacted] in additional annualized gross revenue (based on the 2016 study)."); UPX0198 at -325 ("We need to do a cost vs benefit analysis of features at every launch, because we can't launch everything due to resource constraints."); UPX0215 at -953 ("It is anticipated that IS gains from 2020 launches in aggregate . . . will range between [redacted], which a study suggests will have a revenue impact of between [redacted]."); Des. Tr. 207:21–209:18 (Moxley (Google) Dep.) (Google considers "a number of factors in deciding what [projects] to prioritize," including "business opportunity . . . [and] query volume" as well as the cost of a potential project, which could include the personnel allocation for a particular project). This cost–benefit analysis is the "basic model of what determines investment in economics." Tr. 5837:4–5838:12 (Whinston (Pls. Expert)).

1069. Google's rivals and potential entrants similarly use cost–benefit analyses when deciding whether to invest in search-quality improvements. Tr. 2642:23–2643:2 (Parakhin (Microsoft)) (search investment "fundamentally . . . boils down to what kind of a long-term revenue we can achieve"); Tr. 2344:3–20 (Giannandrea (Apple)) ("[I]f you were going to make a

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multibillion-dollar investment [in a search engine], you would need to have some business justification for it.”).

1070. Google’s contracts reduce incentives to invest and innovate because they “reduc[e] the benefits” of investing and innovating. Tr. 5837:4–5838:12 (Whinston (Pls. Expert)). With the contracts in place, the increase in traffic a rival will get from the investment or innovation is less than in a competitive world. *Id*. 5837:4–5838:12. This is why, with Google’s contracts in place, investments and innovation are less attractive to current rivals, Google, potential entrants, and distributors. *Id.*

1. Google’s Contracts Reduce Rivals’ Incentives To Invest In Improving Search

1071. If firms lack incentives to invest to improve their quality, they will not improve and they will be weaker, less effective competitors. Tr. 5840:20–5841:3 (Whinston (Pls. Expert)).

1072. Google’s contracts reduce rivals’ incentives to invest in improving search. When asked what criteria he considered when making investment decisions for search, Mr. Parakhin testified that “fundamentally it boils down to what kind of a long-term revenue can we achieve,” listing factors including distribution and competitive position in terms of quality. Tr. 2642:23–2643:8 (Parakhin (Microsoft)). He explained that “distribution is basically an ability to get [general search] services in front of user[s];” without the “ability to effectively distribute, it’s almost meaningless to invest in [search].” *Id*. 2643:9–23; Tr. 3495:23–3497:12 (Nadella (Microsoft)) (Because Microsoft can get distribution on desktop devices, it makes more sense to invest in improving desktop search over mobile, where it cannot get distribution.); Des. Tr. 162:11–163:17 (van der Kooi (Microsoft) Dep.) (Investing in infrastructure and local search quality is a fixed investment, and “if [a general search service] lack[s] the volume of usage, it becomes prohibitive to participate and to make those fixed-costs investments.”).

[redacted]

1073. As Prof. Whinston explained, when DuckDuckGo thinks about how much to invest in improving quality, it considers how much it can possibly get as a benefit from that investment, and to the extent that these contracts are in place and tie up the market, there is less that DuckDuckGo can foresee as a benefit of investing. Tr. 5782:9–5783:14 (Whinston (Pls. Expert)).

1074. Lack of access to search users makes it more likely competitors will reduce search engine capabilities or exit the market altogether. According to the Chief Strategy Officer of Ask.com, Mark Stein, Ask's inability to access users was a factor in Ask's decision to stop crawling and indexing the web. Des. Tr. 270:10–271:7 (Stein (IAC) Dep.).

1075. Bing's inability to access mobile users due to Google's contracts has reduced Microsoft's incentives to invest and improve search, particularly on mobile devices. As one Microsoft executive put it: "It is uneconomical for Microsoft . . . to invest more in mobile [search quality]" because "no amount of investment without securing some way to do distribution in mobile will result in any share gain." Tr. 2750:25–2751:11 (Parakhin (Microsoft)); Tr. 3496:17–3497:12 (Nadella (Microsoft)) (After fixed cost investments to build out the infrastructure required for general search, "it quickly becomes how do you get enough queries to continuously improve search quality."); Des. Tr. 112:9–25, 113:7–114:10 (Ribas (Microsoft) Dep.) ("[O]ne of the challenges we always had was, especially in mobile where we didn't have the volume, how can we justify going to spend hundreds of millions of dollars or billions of dollars in – in more data centers and, you know, in more infrastructure when . . . we don't really have the volume, where we're locked from getting the volume?").

1076. Microsoft has invested in improving desktop search because Microsoft has better access to distribution on desktop than on mobile. Tr. 3496:17–3497:12 (Nadella (Microsoft))

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(Microsoft has focused on making both the necessary fixed costs and dynamic data acquisition on desktop where it has better access to consumers.); *id*. 3525:4–3526:9 (in the 2018 negotiations with Apple, Microsoft pointed out that on desktop, which is more open than mobile, Microsoft has won share and improved quality); UPX0236 at -340 ("We have shown that we can compete with Google on quality in [English] markets, and by attaching ton Windows PC distribution we managed to grow US share for 84 consecutive months.")

1077. Although Microsoft has made significant investments in search, Mr. Nadella explained that for him to justify investing even more there must be an opportunity to compete for more mobile users. Tr. 3508:6–18 (Nadella (Microsoft)) ("Because, one, in order to start investing—we're making all the fixed cost investments already. And for us to make additional fixed cost investments on, say, search relevance or search scale, we needed to get more of the dynamic data and mobile distribution.").

1078. In fact, Microsoft had a "playbook" ready for the investments it would make if it could gain access to more mobile users. Tr. 3252:13–3255:3, (Tinter (Microsoft)) ("[W]e know what investments we need to make, we knew what engineering work we needed to do that we could improve relatively quickly."); *id.* 3256:17–3258:13 (describing UPX0797). Obtaining access to more mobile users would be "game changing" and lead to a significant investment. Tr. 2723:4–6 (Parakhin (Microsoft)) (discussing a potential distribution deal with Apple); Des. Tr. 94:11–19 (Ribas (Microsoft) Dep.) (A distribution deal with Apple would increase Microsoft's incentives to invest in search.).

2. Google's Contracts Reduce Google's Own Incentives To Invest

1079. Google's contracts reduce its own incentives to invest in search. Tr. 5782:9–5783:14 (Whinston (Pls. Expert)) ("Google is going to run faster if it has more competition."). Google's contracts directly reduce its incentives to invest because, with the contracts in place,

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Google is less likely to lose users if it fails to improve or maintain its search quality. *Id*. (Google doesn't have to worry if its quality "isn't as good as it might have been.") Google's distribution contracts also reduce competition from rivals which further reduces Google's incentives to invest. *Id*. ("[H]aving weaker rivals also reduces Google's concerns over losing customers.").

1080. For example, Google invests in using massive amounts of user data because the benefits of doing so outweigh the costs. *Supra* ¶¶ 203–207 (§ III.E.5). But, as Dr. Nayak explained, Google decides how much data to use by engaging in a cost-benefit analysis, weighing the benefit of using more data and increasing quality against the cost of processing the data. Tr. 6337:6–6338:6 (Nayak (Google)) ("[A]s you get more data, it's more expensive to process. So the cost of processing the data goes up . . . . The time to process it goes up . . . . And so there is this trade-off that we have in terms of amount of data that you use, the diminishing returns of the data, and the cost of processing that data. And so usually, there's a sweet spot along the way where the value has started diminishing, the costs have gone up, and that's where you would stop.").

1081. If Google were not insulated from competition by its search contracts, competition would force Google to improve quality. Tr. 5862:18–5863:13 (Whinston (Pls. Expert)). Benefits that look marginal to a monopolist may suddenly look attractive—or necessary—to a firm facing rivalry because competition changes the costs and benefits. *Id.* When Google faces more competition the "whole calculus changes, and now the rational business decision" is to invest more to improve quality. *Id*. 5862:18–5863:13. "[Competitive markets] force firms . . . to do things that are good for consumers." *Id*. 5862:18–5863:13.

1082. Google's investment in research and development is small compared to other firms in the software and computer industry. Tr. 5857:5–5858:21 (Whinston (Pls. Expert))

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(discussing UPXD104 at 79 showing Google's R&D to sales ratio small compared to other software and computer services firms). In fact, Google spends more on securing defaults than on all other search-related expenses combined, including product launches and improvements. UPX0249 at -556 (showing that Google's overall expenses declined per billion queries, even as its TAC expenses increased); Tr. 1677:14–21 (Roszak (Google)) (discussing UPX0249 at -556); Tr. 7575:3–7577:6 (Raghavan (Google)) (TAC is the largest single expense for Search + and greater than all other expenses combined; explaining UPX7002.A); *id.* at 7577:7–24 (Google spends much more on TAC than on R&D for search; discussing DXD-21 at .002).

1083. Google has underinvested in latency, crawl rate, index size, and other Search features. Tr. 6397:9–18 (Nayak (Google)) (as of 2020, the size of Google's index had declined, concerning engineers at Google); Des. Tr. 187:10–23, 189:4–13 (Google-PN 30(b)(6) Dep.) (Google does not track latency for other search engines but has done one experiment in the past with Bing, around 2017, which revealed a latency gap of about 300 milliseconds); UPX0249 at -547 ("Since 2014, index size down 48% . . . crawl rate down 35%, and processing down 33%."); UPX0752 at -017 ("As a consequence of efforts to drive cost efficiency (Search machines spend has declined from 2014 to 2017 despite 45% total increase in queries across that time), we have under-invested in Machines and seen impacts to product quality (smaller index, higher latency, blocked launches, serving errors").

1084. For example, Google's performance on latency declined between 2011 and 2020, with latency rising from 150 milliseconds to 650 milliseconds in that period. UPX0223 at -122 (showing 500 mx increase in latency from 2011–2020), -086 (Bing beat Google on latency for five common queries); Tr. 7448:4–20 (Raghavan (Google)) (discussing UPX0223 at -122 and agreeing latency grew by a significant amount from 2011 to 2020). Despite this, a 2017

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presentation prepared for Mr. Giannandrea, then head of Google Search, by the finance team, including Mr. Roszak, stated, "Budget only spent for ROI positive latency launches." UPX0249 at -548.

1085. Google has been willing to sacrifice quality for profits. In 2018, Mr. Raghavan had an email exchange with then-VP of Finance, Carlos Kirjner. Mr. Kirjner was pushing Mr. Raghavan for a more aggressive revenue plan for the Ads team. Tr. 7555:22–7556:15 (Raghavan (Google)). Mr. Raghavan told Mr. Kirjner, "I've met enough engineers and PM who want to quit (and many are quitting) because they think we pay lip service to the user experience and squeeze out revenue, while pushing them to hit heroic monetization milestones." UPX0734 at -509; Tr. 7553:16–7554:8 (Raghavan (Google)) (agreeing that he wrote this statement because he believed it). These engineers and PMs believed that Google's push for monetization was damaging the user experience. Tr. 7554:9–14 (Raghavan (Google)). He went on to say, "I'm all for cleverer expanded match and auction pricing, but know that the former comes at some cost to users and the latter at a cost to advertisers; both come at a cost to our most critical product talent." UPX0734 at -509; Tr. 7555:4–20 (Raghavan (Google)) (If done poorly, expanded math "could come at a cost to either the user or the advertiser or both," and auction pricing was a reference to auction mechanisms or launches "that do things that are not right for the long term."). Mr. Raghavan noted that what seemed different at this time was "more than one exiting person has given me the sense that 'management' has held them to the 20% bar . . . and they feel pressure to perform . . . by reaching into user experience impact that they wouldn't have contemplated a couple of years ago." UPX0734 at -509; Tr. 7556:24–7557:8 (Raghavan)) (the 20% was a reference to a 20% OKR); *supra* ¶¶ 711–712. In 2019, Mr. Gomes, then Sr. VP of Search, expressed concern that Search was "getting too close to the money," at the expense of

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quality-related issues like privacy and innovation. UPX2044 at -998. Mr. Gomes expressed his view that "we are getting too involved with ads for the good of the product and company," and "[w]e need to think of other issues like DuckDuckGo and the privacy challenge and our innovation narrative." UPX2044 at -998. Mr. Gomes was "concerned that growth is all we are thinking about*." Id.* at -998; Tr. 8129:25–8130:15 (Gomes (Google)).

1086. In 2018, Google considered improving the quality and visibility of "Nav suggestion," a general search services feature permitting a user searching google.com with a navigational query (e.g., "Facebook") to go directly to the destination page without stopping at a SERP. The product team explained that the change would benefit users because it would "expedite user journ[ies] . . . increas[ing] the visibility of nav suggestions, and boost[ing] user confidence in them." UPX0762 at -250; Des. Tr. 219:21–221:1 (Moxley (Google) Dep.). Emily Moxley, then-Senior Director of Product Management, blocked this feature because she was "hesitant to go this direction," which would reduce the number of SERPs served and advertising revenue collected, because "we are losing not just people with nav intent, but people that end up interacting with other units on nav queries." UPX0762 at -249; Des. Tr. 219:12–222:5 (Moxley (Google) Dep.).

1087. When the restrictions imposed by Google's exclusionary contracts are not in place, Google is forced to compete more vigorously by investing more in search. For example, a choice screen in Europe forced Google to increase investment in search to the benefit of consumers. Tr. 5844:5–5848:14 (Whinston (Pls. Expert)) ("Consumers were getting content that they weren't getting before. Why? Because it cost Google money to get that content and why do it if you're not threatened?"); UPX0764 at -077 (identifying feature, content, and trust improvements to Google Search in Europe following the choice screen).

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1088. Following a July 2018 European Commission ruling, Google was forced to implement a choice screen in the European Union prompting users to select their default web browser and search app during initial device setup. UPX8091 at -504–05. The choice screen went into effect in early 2020, UPX8091 at -505, and the auction by which GSEs could seek to appear on the choice screen underwent several changes, most recently in September 2021. Tr. 10609:8–22 (Whinston (Pls. Expert)). With the rollout of the European choice screen, Google modeled projected revenue and market share loss. Tr. 8147:8–8148:12 (Gomes (Google)) (discussing UPX0749 at -081).

1089. Google believed that the European choice screen put its "revenue at risk," UPX0749 at -276, and responded to the increased competition by launching its "Go Big in Europe" investments, which focused on driving daily active users. UPX0749 at -276 (describing Go Big in Europe and noting "choice screen revenue at risk"); Des. Tr. 204:17–205:17, 206:4–8 (Moxley (Google) Dep.) ("Go Big in Europe" focused on driving daily active users due to the potential revenue risk of the implementation of a choice screen in Europe); UPX0761 at -748 ("Go Big in Europe" Google's "response to the coming EU choice screen launch in Jan 2020."). Google invested millions of dollars and assigned additional full-time engineers to launch new search features in certain European countries. Tr. 8152:12–25, 8154:1–15 (Gomes (Google)).

1090. These Go Big in Europe investments were "***above and beyond***" business as usual and were meant to "make sure Google is top of mind for EU users." UPX1083 at -055 (emphasis in original). In response to the European choice screen, Google rolled out search improvements—including (a) "best-in-class or exclusive experiences," e.g., enhanced sports highlights, and (b) features showcasing local content. Tr. 8150:13–23; Tr. 8152:5–8 (Gomes (Google)) (discussing UPX0749 at -276); Des. Tr. 206:18–207:20 (Moxley (Google) Dep.)

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(Google prioritized initiatives to improve the search experience for users after the European choice screen was announced); UPX0764 at -077 (two pillars of Google's Go Big in Europe investments were unique features and enhanced local content); UPX0765 at -311–12 (listing the highlights of Go Big in Europe product launches).

1091. Even more recently, Google responded to competitive pressure that Microsoft generated by integrating ChatGPT into Bing. Microsoft was "a huge investor" in the company that developed ChatGPT. Tr. 8269:8–16 (Reid (Google)); Tr. 3528:2–3529:2 (Nadella (Microsoft)). ChatGPT was announced to the world around November 2022. Tr. 8269:5–7 (Reid (Google)). About three months later, Microsoft announced it would integrate ChatGPT's technology into Bing to give the user a "copilot" experience with Bing search. *Id*. 8272:4–14. Anticipating Microsoft's announcement, Google launched Bard, Google's own chatbot, *one day* before Microsoft's announcement. *Id*. 8272:1–7; *id*. 8277:8–11 (Google continues to watch what Microsoft does with AI products). Competitive pressure forced Google to modify its business plans.

1092. Finally, the fact that Google responds to regulatory action with "positive innovation-focused moments" belies the testimony of Google executives that Google innovates simply because of company ethos. UPX0792 at -487 (Nov. 2019 email stating, "[w]e're taking a similar approach to the DOJ suit, landing a series of positive innovation-focused moments leading up to the AG complaint").

3. Google's Contracts Reduce Entry And Outside Investment In Search

a) Google's Contracts Reduce Apple's Incentives To Participate More Fully In Search

1093. Google recognizes that Apple is a potential entrant into general search. Google executives have "internally had conversations that [Apple] may be possibly building a search

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engine," Tr. 7693:12–22 (Pichai (Google)), and understand that Apple has the resources to do so. Tr. 8094:11–8095:5 (Gomes (Google)). In 2018, Apple hired Mr. Giannandrea, who was then the head of Google search. Tr. 2164:18–2165:14 (Giannandrea (Apple)). As Apple has recruited additional Google search employees, Mr. Pichai asked to be personally notified in "every individual case[]" when this occurs. UPX1092 at -456. In response to one Apple hiring event, Google employees discussed "Apple's ability and likely plan to build web answers and a general search engine." UPX0339 at -683. An internal Google memorandum written in 2020 discussed "the risk of Apple (potentially) launching its own search engine, replacing us a default." UPX0002 at -390; Tr. 8694:24–8695:1 (Israel (Def. Expert)) (Google considers Apple a potential entrant that Google worries about).

1094. Google's concern is well founded. Apple receives approximately [redacted] billion queries on its devices per week across Safari, Spotlight, and Siri. Tr. 2246:11–2247:9 (Giannandrea (Apple)). Apple "intercept[s]" each query that it receives and decides whether to send it to Google. *Id*. 2243:25–2244:10, 2281:5–10. By intercepting queries in this manner, Apple can instantaneously decide whether to answer a given query on its own or send the query to a different third party that may be a better fit than Google. *Id*. 2223:11–16 ("We're intercepting every query you're trying to do and trying to decide whether we can help."); *id*. 2244:11–18 (Apple has the technical capability to send different queries to different search providers.).

1095. Apple is "serious" about search and has been investing in "[redacted]" needed for a search engine. Tr. 2244:19–2245:18 (Giannandrea (Apple)); UPX0659 at -213 [redacted]. Apple crawls the web to

[redacted]

support its search capabilities and has steadily been increasing the number of pages it crawls. Tr. 2207:23–2208:16 (Giannandrea (Apple)). Apple also maintains a web index of about [redacted] billion pages and has been investing in growing the index. *Id*. 2212:9–23.

1096. Over time, Apple has considered ways to "disrupt Google Search." UPX0626 at -729 ("[w]hat else would be helpful to discuss how we disrupt Google search?" with "high level themes" of "[a]nswer more queries" and "[m]ake spotlight a good starting point for *all* searches"); UPX0625 (goals for "Disruptive Search" include "make something better for our customers," "hurts Google revenue engine," and "revenue opportunity").

1097. Upon joining Apple, Mr. Giannandrea led an effort to "[redacted]." Tr. 2228:19–2229:1 (Giannandrea (Apple)) (discussing UPX1123 at -511). Apple devoted approximately [redacted] to this effort and an annual investment of "[redacted]." *Id.* 2227:18–2229:1. With this project—alternatively referred to as [redacted] —Apple sought to build [redacted] UPX1123 at -511.

1098. Apple understands that it has the capability to compete more directly with Google in general search. Tr. 2261:25–2262:2 (Giannandrea (Apple)) (Apple could build a search engine to compete with Google.); *id.* 2247:14–19 (agreeing that "Apple has the resources, financial and technological, to develop or acquire a general search engine."); *id.* 2206:4–6 (Apple has not decided against developing its own GSE.).

1099. But Google's revenue share payments make Apple far less likely to do so. As explained in a 2020 Google memorandum, Apple entering search "would have two different and

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separate sources of negative impact on [Apple's] free cash flows and valuation[:] the loss of revenues and the increased costs." UPX0002 at -392. Apple would not only have to incur the cost of building and maintaining a search engine (which Google valued at $[redacted]B); it would also have to forego Google's revenue share payments under the ISA (which Google valued "in excess of $[redacted]B"). UPX0002 at -392–93; Tr. 5849:9–5850:10 (Whinston (Pls. Expert)) (discussing UPX0002 and Google's explicit acknowledgment that the "forgone payments" would help "dissuade Apple from wanting to come in"); UPX0339 at -683–84 (Apple could use Siri and Spotlight as "beachhead products" for broader entry into search, but "in the near term our deal may be lucrative enough (at least on Safari)" to keep Apple at bay). One way that Apple could enter search would be by acquiring Bing and investing to improve it. Apple has considered this approach but recognizes that any benefits would have to be weighed against the cost of losing its ISA payments from Google. Tr. 2294:8–15 (Giannandrea (Apple); UPX0460 at -176 (illustrative modeling of Bing acquisition "Relative to Google Deal" under various sets of assumptions); Des. Tr. 182:12–14, 182:16–183:4, 196:2–23, 205:23–211:24, 212:23–215:20, 215:22–25 (Perica (Apple) Dep.) (discussing UPX0460).

1100. The revenue share payments that Apple receives from Google play an important role in Apple's decision-making about search. Tr. 2463:15–18 (Cue (Apple)). For example, in 2016, if Google had not agreed to Apple's minimum economic terms during the ISA negotiations, Apple would have walked away from the agreement. UPX0594 at -852 (Email from Eddy Cue to Tim Cook: "You and I need to decide what is our absolute min is. I told [Mr. Pichai] that him and I need to sit down alone next week and agree to the economic terms or we shouldn't move forward."); Tr. 2465:8–19 (Cue (Apple)) (if Apple and Google could not agree on economic terms, "there's no deal").

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1101. No existing GSE besides Google represents a "valid alternative" that Apple could set as the Safari default. Tr. 2464:8–2465:7 (Cue (Apple)). Consequently, if Apple were unable to reach a revenue share deal with Google, its next best option would likely be to build its own GSE. *Id*. 2540:15–2542:1 (in the 2016 negotiation, "it wasn't a choice to pick any of the [other] existing search engines, so we probably would have been left with no other choice than potentially building our own"). Thus far, Apple has chosen to accept Google's revenue share payments rather than launch its own GSE. Tr. 8697:13–19, 8698:22–8700:5 (Israel (Def. Expert)) (Apple is making a "make-versus-buy decision about how to handle search," and the ISA's terms led Apple to "choose to buy, not make").

1102. Apple's participation in search need not be an all-or-nothing proposition. Because Apple reviews each query it receives, *supra* ¶ 1094, Apple could increasingly choose to divert additional queries away from Google by answering them itself or sending them to a third party, even if Apple did not launch a full-fledged general search service. Tr. 2220:13–19 (Giannandrea (Apple)) ("every query that we provide an answer to is a query that doesn't go to Google"); UPX0002 at -390 (Google memorandum explaining that "[l]aunching its own search engine is not the only step Apple could take to shift search traffic away from us. It could replace us as the Safari default by Bing, DuckDuckGo or a larger number of local search engines (eg, Yandex, Navr), totally or partially. It could replace us for certain types of queries."); UPX0798 at -905 (Apple email to Microsoft discussing an approach in which Apple would send some queries "to Google to maximize revenue/obey the ads contract" and send other queries to Bing to give Bing "mobile queries to build [its] search engine").

1103. One way that Apple diverts queries away from Google is with its Suggestions feature in Safari. This feature offers users information and recommendations as they enter text

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into Safari's URL bar. Tr. 2208:22–2209:4 (Giannandrea (Apple)) (describing Suggestions); *id.* 2216:25–2218:5 (agreeing that Suggestions "attempt[s] to guess what the query is asking for and to provide the right path to the answer").

1104. In some Suggestions, Apple provides its own answers directly to the user, and in others, Apple provides links to third-party websites. Tr. 2234:1–2235:4 (Giannandrea (Apple)) (responding to the Court's questions regarding UPXD007 and explaining that "we will either offer straight-up answers or suggestions like this navigation query or suggestions [that you] might want to get something from your device").

1105. Apple believes that the Suggestions feature offers "a much better user experience." Tr. 2235:6–7 (Giannandrea (Apple)) (Suggestions saves people time and a trip to Google); *id.* 2219:25–2220:5 ("Our general approach is we think users of our devices are seeking answers, and so if we can provide the answer, we will do that rather than sending them off to a general search engine."); UPX0618 at -265 ("turn[ing] off all displacement of queries and fall[ing] back to Google" would be "worse for users").

1106. But although this feature offers benefits for users, it represents a threat to Google. Suggestions allows users to "bypass Google" and reach their destination directly. Tr. 2218:6–14 (Giannandrea (Apple)). In these cases, Google does not have an opportunity to monetize the user's query. Tr. 5003:3–5004:1 (Braddi (Google)). Thus, when Apple expanded its implementation of Suggestions in 2014, Google analyzed the potential impact to Google and concluded, "Bottom Line: It's bad." UPX2010 at -527 (estimating that Apple "siphon[ing] queries away" would cause Google to lose 10–15% of its queries on Safari and 4–10% of its revenue from Safari queries). Google has told Apple that "reducing diversions, not showing both

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a top hit and a suggestion, and elevating the positioning of Google search results relative to Apple results . . . would be worth hundreds of millions of $s annually." UPX0627 at -256.

1107. During the negotiation that led to the 2016 ISA amendment, Google considered various ways to limit Apple's use of Suggestions. An internal Google email explained, "we are trying to build a structure that prevents [Apple] from diverting queries and destroying value." UPX2011 at -001; Tr. 5010:19–5011:10 (Braddi (Google)) (confirming Google's concern was with Apple diverting queries). In another exchange, Google discussed "listing the current triggering providers that [Apple] could continue to use" for Suggestions because Google was "trying to ensure this does not grow above what it is today." UPX0965 at -102 ("Also, would be great if we can contain the number of results they present above ours over time (with probably the exception of 'search history')"). In a term sheet that Google sent to Apple, Google included language stating that "Apple will not directly or indirectly take any action or make any omission that adversely impacts the expected economic benefit to Google . . . including, without limitation, by editing, filtering, truncating, appending terms to or otherwise modifying any Search Query originating from [Safari] (e.g., by using Apple's 'suggests' algorithm in connection with Search Queries) or by altering [user interfaces]." UPX2012 at -006–07; Tr. 10026:12–18 (Murphy (Def. Expert)) (discussing UPX2012 and agreeing that "prevent[ing] Apple from shifting queries from Google" was "one of [Google's] concerns" in these negotiations).

1108. After further discussion, Apple ultimately agreed to Google's request for the "substantially similar" clause that appears in the 2016 ISA and remains in effect today. Tr. 7663:6–17 (Pichai (Google)) (agreeing Google requested "substantially similar" language.); *supra* ¶ 227. This clause prohibits Apple from making any product design change (including any

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change to Suggestions) that would cause Apple's use of Google in Safari to no longer remain "substantially similar" to its use in 2016. *Supra* ¶¶ 227, 229.

1109. The "substantially similar" clause limits the extent to which Apple may use Suggestions to divert queries away from Google. In 2018, Ms. Braddi, who was actively involved in negotiating the 2016 ISA, explained "really what the agreement states" to a colleague at Google. UPX0309 at -823. She wrote: "Up to about 3 yrs ago, [Apple] only referred user[s] to Wikipedia as a suggestion, the rest were provided by Google. However, ~2+ yrs ago we saw them increasingly offer the user other suggested redirections. This concerned us which is why we added into the agmt that they could not expand farther than what they were doing in Sept 2016 (as we did not wish for them to bleed off traffic)." UPX0309 at -823. Similarly, draft Google prep materials for a December 2018 meeting between Mr. Pichai and Apple CEO Tim Cook explain: "We have been concerned for some time that search traffic cannibalization may be occurring on Apple devices via a few factors, primarily by Safari 'Suggest' but possibly also through Siri[.] . . . We even included a provision in the most recent agreement to protect against further cannibalization." UPX2050 at -652.

1110. The "substantially similar" clause limits Apple's use of Suggestions in several ways. For example, Apple must "keep their triggering for offering more and more suggestions to the user limited to . . . the trigger rates that they were doing as of September 2016." Tr. 5017:9–5018:23 (Braddi (Google)). At trial, Ms. Braddi recanted her deposition testimony on this point, *id*. 5076:7–11, but her ordinary-course documents confirm her initial testimony and undermine her credibility. UPX0895 at -904 ("[Apple] has agreed not to implement any changes to the Safari Suggest product that could meaningfully change or divert the Safari traffic they refer to Google.com beginning in Sept. 2016. . . . We wish to go back an[d] categorize the search queries

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in Sept 2016 and measure the changes since to determine if they are meeting the obligations."); UPX2014 at -896 ("We need to re-evaluate the changes to the % of non-conversion against the 'suggest' pattern that Apple Safari exhibited back in Sept 2016 to identify where they may not have 'remain substantially similar in use.' I know Chris took a baseline back in Sept 2016 of how often and in what categories Apple was initiating an 'Apple Suggest' to the user for possible redirection. Since this time, we have seen an increase of 5% to the number of queries that do not complete to Google for results. Can we determine the new categories or where the increase is due to them changing the experience away from 'substantially similar' to 2016?").

1111. In addition, the "substantially similar" clause limits the way that Apple may "present" its Suggestions to users. Tr. 5016:25–5017:3 (Braddi (Google)) (responding to the Court's question and testifying that the "substantially similar" clause applies to the "quality and presentation" of Suggestions). The "substantially similar" clause also limits Apple's ability to make Suggestions that result in certain queries being sent to third-party websites other than Google. Tr. 5077:10–5078:15 (Braddi (Google)) (the clause was intended to address Google's concern that Apple might "sell[] off the traffic to other bidders" such as Amazon or Yelp); Tr. 7663:6–7664:2 (Pichai (Google)) (explaining that the clause was intended "to make sure, as we contemplate a longer term deal, that the notion of default was reasonably preserved in a similar way, particularly with respect to Apple being able to send queries to rival providers").

1112. Each of these limitations restricts Apple's flexibility to design its products in ways that may be good for consumers but would result in fewer queries for Google. Tr. 5850:12–5851:4 (Whinston (Pls. Expert)) (discussing UPXD104 at -073 and Google's response to the threat of Suggestions).

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1113. Another way that Apple could compete more directly with Google is through Spotlight. Spotlight is a "universal search" feature on Apple devices that is primarily used to search for on-device content but can also be used to search for information on the web. *Supra* ¶ 8.

1114. As Apple has considered ways to "disrupt Google search," it has discussed "[m]aking spotlight a good starting point for *all* searches." UPX0626 at -729 (emphasis in original). Given Spotlight's potential to affect Google's business, Google has "pa[id] attention" to Apple's choices in this area. Des. Tr. 55:24–15, 57:5–19, 58:10–11, 58:14–59:10 (Fox (Google) Dep.) ("[W]e've been, I would say, paying attention what Apple has been doing with Spotlight. I don't know if I would call Spotlight a general search engine or not, but . . . it is addressing users' information needs, and so that's something that we've been paying attention to").

1115. Apple currently sells Search Ads that allow advertisers to promote iOS applications in response to user queries in the App Store. Tr. 2635:25–2636:1 (Cue (Apple)). Apple does not currently sell ads in response to user queries on Spotlight. *Id*. 2496:23–24.

1116. Members of Apple's advertising team have expressed a "strong desire" to expand the company's ad offerings to Spotlight, but they have recognized that the ISA would limit their ability to do so. UPX0959 at -177. In 2020, Apple's advertising team prepared to launch a trial in which they would show ads for relevant iOS apps (much like the ads run in the App Store) in response to queries entered into Spotlight and Safari. UPX0959 at -177–78. Before undertaking this trial, they discussed what "constraints" the company would face with respect to such an offering due to "the Google deal." UPX0959 at -178. Winston Crawford, Apple's Global Senior Director of Business Management for Ad Platforms, noted that the right-of-first-refusal provision

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of the ISA does not apply to Safari. But with respect to Spotlight, he explained, "testing aside . . . . if we were to commercialize an ad offering in Spotlight we would first need to work with Google. This could open up discussions that lead to a form of renegotiations which I don't think anyone wants to do right now. So while we have a strong desire to enter Spotlight, it is complex and carries some risk as it relates to the Google contract." UPX0959 at -177–78.

1117. Google is well aware of the potential for Apple to sell ads on Spotlight. In a 2020 exchange, Google employees opined that although Apple does not currently offer ads in response to queries on Siri or Spotlight, "of course that could change." UPX0339 at -684 ("One thing to consider is that Apple's privacy narrative would be counter to advertising on Siri or Spotlight queries, as they have shown a strong position against products built on monetizing users through ads (of course that could change).").

1118. Under the ISA, if Apple wishes to sell ads on Spotlight, it must give Google the right-of-first-refusal to supply the ads. *Supra* ¶ 230. If Google does choose to supply the ads, then the revenue share terms that apply to Safari queries would apply to the Spotlight queries as well. JX0033 at -796 (§ 2) (applying "the financial terms set forth in Section 4 of this Agreement" to any ads on Spotlight). In other words, Google would take 60% of the net revenue for the sale of these ads, and Apple would receive only 40%. *Id.* at -797 (§ 4); Tr. 10021:20–10022:1 (Murphy (Def. Expert)) (agreeing that serving ads on Spotlight could be less valuable for Apple because they would have to share the money with Google).

1119. In this way, the ISA's right-of-first-refusal provision reduces the money that Apple would make selling search ads in Spotlight, and accordingly, reduces its incentive to do so. Tr. 6063:1–5 (Whinston (Pls. Expert)) ("I think it keeps Apple potentially out of selling ads."). This protects Google's Search Ads monopoly.

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b) Google's Contracts Reduce Distributors' And Nascent And Potential Competitors' Incentives To Invest In Novel Search Products

1120. Google's contracts also reduce distributors' and nascent and potential competitors' incentives to invest in innovative search tools. Tr. 5851:5–5852:5 (Whinston (Pls. Expert)) (discussing the effect of Google's conduct on distributors' incentive to partner with Branch). As Dr. Ramaswamy explained, Google's contracts effectively "freeze the ecosystem in place" to the detriment of nascent and potential competitors whose services could have eroded Google's monopoly in general search services had they found traction with distributors. Tr. 3796:5–3798:22 (Ramaswamy (Neeva)); Tr. 5851:5–5852:5 (Whinston (Pls. Expert)) (though not a GSE, Branch's app-search tool facilitated a type of search that could threaten Google's monopoly).

1121. Google's RSAs include prohibitions on distributors' ability to preinstall alternative search services on their devices. *Supra* ¶¶ 261–263. Although distributors generally understand the RSAs provisions to prohibit preinstallation of services that directly compete against Google Search, like Microsoft's Bing, the provisions are drafted broadly enough to encompass services like Branch's app-search tool, even though it is not a GSE. Tr. 5851:5–5852:5 (Whinston (Pls. Expert)); Des. Tr. 184:5–185:3 (Ezell (AT&T) Dep.) (describing alternative search services as including "typical web search that you would do through a search engine" and listing Bing as an example); *id.* 240:15–241:4 (Branch is not a substitute for a GSE like Bing). As a result, Google's RSAs discouraged OEMs and carriers from preloading Branch's app-search tool without restrictions on its functionality; Branch has never reached a deal with an OEM or carrier to distribute its app-search tool with all of its intended features. *Supra* ¶¶ 836–848.

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1122. Alarmed by the nascent threat of Branch's program, Google acted to prevent distribution of Branch's tools altogether. Those actions included informing AT&T that Google viewed AT&T's RSA as prohibiting preinstallation of even the limited version of Branch's app-search tool if it required a connection to the internet. *Supra* ¶¶ 849–861. As Mr. Ezell explained, Google's intervention raised the stakes for AT&T, which ultimately concluded that the risk to its revenue share outweighed the potential economic upside of working with Branch. *Supra* ¶ 860.

1123. Google's contracts have also dissuaded Branch from continuing to invest in its own novel search services. Tr. 2948:22–2949:6 (Austin (Branch)).

1124. Venture capital firms view general search as a "no-fly zone." Tr. 3510:24–3512:7 (Nadella (Microsoft)) (given the barriers to entry and cost to invest in a GSE, Silicon Valley investors consider general search to be the "biggest no-fly zone."); UPX0240 at -507 (in 2018 email, Giannandrea wrote, "the reason a better search engine has not appeared is that it's not a VC fundable proposition even though it's a lucrative business"); Tr. 5848:15–5849:4 (Whinston (Pls. Expert)) ("[S]earch is a place that venture capital does not go."). Venture capital firms' hesitancy to invest in search startups creates difficulties for potential entrants; even start-ups with well-funded and talented teams, like Neeva's, can be forced to shut down if they fail to gain enough traction quickly enough to justify additional investments. Tr. 3674:16–3675:6 (Ramaswamy (Neeva)) (discussing Neeva's decision to shut down in part due to reduced interest from venture capital firms over time); *id.* 3723:22–3724:23 ("[I]f a well-funded and exceptionally talented team like Neeva could not even be a provider on most of the browsers, I don't see that as the market working.").

1125. Branch has poured hundreds of millions of dollars and countless employee hours into developing an app-search tool, but it now believes that the product has no path to

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distribution. Tr. 2948:22–2949:6 (Austin (Branch)). At least in part because of the implications for raising funds, it is likely that Branch will stop pursuing its original app-search vision. *Id.* 2923:1–21 (discussing need to show progress to investors on revenue generation). If that happens, consumers will not only be deprived an innovative tool for navigating and discovering app content, but also a technology that could have threatened Google's search monopoly by providing an alternative to web search. Tr. 5851:5–5852:5 (Whinston (Pls. Expert)) (Branch's app-search tool could provide "a measure of one-stop shopping over apps that would be more like a general search engine.").

C. Reduced Competition Reduces Search Quality And The Options Available To Consumers In General Search Services

1126. Absent Google's exclusionary contracts, consumers likely would have had significantly better and more varied search services. Tr. 5858:23–5859:1 (Whinston (Pls. Expert)).

1127. Reduced competition in the U.S. general search services market reduces the quality and the options that consumers have, which means consumers are likely to be worse off. Tr. 5854:11–20 (Whinston (Pls. Expert)) ("[T]here's harm because quality is super important for consumers and if competition or lack of competition reduces the quality and the options that consumers have, consumers are going to be highly likely to be worse off.").Lack of competition in the U.S. general search market means quality changes (or lack thereof) have little impact on whether users leave Google, reducing Google's incentives to invest, which in turn reduces the quality of the general search services consumers receive. *Supra* ¶¶ 571–574 (§ V.A.4.c); Tr. 5782:9–5783:14 (Whinston (Pls. Expert)) (Google's contracts insulate Google from competition; Google need not worry about losing many customers if it fails to invest in improving its general search services.).

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1128. "[Competitive markets] force firms . . . to do things that are good for consumers." Tr. 5862:18–5863:13 (Whinston (Pls. Expert)); *Supra* ¶¶ 1079–1092 (§ VIII.B.2). For example, if Google were not insulated from competition, the benefit of using more data to improve search goes up relative to the cost of using more data, which means the rational business decision for Google will be to use more data and improve search to the benefit of users. Tr. 5862:18–5863:13 (Whinston (Pls. Expert)).

1129. Because quality, like price, is important to consumers, harm to quality can harm consumers even in a zero-price market like general search services. Tr. 5854:11–20 (Whinston (Pls. Expert)) ("there's harm because quality is super important for consumers and if competition or lack of competition reduces the quality and the options that consumers have, consumers are going to be highly likely to be worse off.").

1130. Harm to competition in general search services does not depend on there being monopoly power or harm to competition in the ads markets. Tr. 5859:2–16 (Whinston (Pls. Expert)).

1. Google Responds To (Rare) Competitive Threats By Increasing Its Search Quality

1131. Google's conduct during rare events in the past when it faced competition as compared to Google's conduct today shows that, when available, competition *forces* Google to work harder than it would have otherwise.

1132. For example, when Bing entered the market in 2009 and began to rise in quality, Google viewed Bing as a competitive threat and responded with a "Precision Code Orange." UPX0974 at -470, -474. Amit Singhal, then-head of Search Ranking, told Google engineers that Google was facing a "serious competitive threat from Bing in ranking" and it "need[ed] to act fast and act decisively." *Id.* at -474; Tr. 1815:4–17, 1815:21–1816:5, 1817:1–3 (Lehman

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(Google)) (discussing UPX0974; in response to Bing's threat, Google's search team had to come up with many ways to improve search quality); UPX0211 at -055 ("Precision is like the weather: Everyone talks about it, no one does anything. Then Bing got a big precision jump, and everything came to a head. Suddenly we actually had to focus full attention on precision."); Tr. 5842:4–22 (Whinston (Pls. Expert)) ("[W]hen Bing was introduced, Google sat up and took notice." (discussing UPXD104 at 65)).

1133. Google increased its focus on search innovation in response to Bing's launch. Shortly after Bing was introduced, an internal Google strategy presentation stressed the urgency of the situation: "Bing is innovating. . . . We need to out innovate Bing[.] We have many more innovations sitting in the search quality area waiting to get out. Get them out." UPX2086 at -512.005. Six months later, the quarterly CEO Report to Google's Board of Directors declared, "[p]racticing what we preach – competition is good for Google, really!" UPX2087 at -697. The Report further explained that, in response to competition from Bing, the "[r]ate of search quality improvements [was] up significantly," there had been "[m]ore/faster search [user interface] innovation and iteration," and Google had made "meaningful technological advances e.g. real time search, voice, instant translate, and visual search." UPX2087 at -697.

1134. As part of its response to Bing's launch, Google launched a search redesign that was "slightly revenue **negative**." UPX0715 at -128 (describing "Skunkworks," a redesign to the Google Search page) (emphasis in original).

1135. Similarly, when Google has faced a strong competitor in other geographies, such as in Russia with Yandex, and in South Korea with Naver, Google invested more in search. PSX00331 at -381–82, -385–90 (In a 2009 Google presentation on "Challenged Markets," countries where Google is not the market leader, Google understood that it must "invest

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substantially more than standard level" and "unleash the innovation machine."); Tr. 2718:5–2719:24 (Parakhin (Microsoft)) ("[O]bviously, we've seen evidence that Google invests much more in [the Russian and South Korean] markets than in others . . . ."); Tr. 5741:20–5744:3 (Whinston (Pls. Expert)) (Yandex in Russia is an example of "circumstances where we see a stronger rival and we see a big change" in users after the institution of a choice screen.).

1136. Google's conduct in the United States today sits in contrast to Google's conduct in response these rare instances of competition. General search services have numerous quality dimensions that consumers care about and in which Google would raise its investment if it faced greater competition. Tr. 5854:21–5856:14 (Whinston (Pls. Expert)) (identifying privacy as one quality dimension and discussing Mr. Raghavan's testimony and an email he wrote (UPX0501) that illustrate Google making the decision not to invest in privacy due to a lack of competition); *id.* 5856:20–5857:4 (There are "unending numbers of ways in which consumers care about quality dimensions of search services, whether it's latency, . . . whether there are . . . local sports scores that are provided, et cetera."); UPX0735 at -156–57 (insufficient machine capacity is resulting in launches, which required significant resources to prepare, being "blocked").

2. Google Offers Consumers Fewer Privacy Options And, By Default, Collects More Consumer Data Than It Would In A Competitive World

1137. One search quality dimension is privacy. Des. Tr. 22:7–9, 22:12–16, 22:19 (Fox (Google) Dep.); Tr. 5854:11–5856:19 (Whinston (Pls. Expert)); Tr. 8694:4–17 (Israel (Def. Expert)).

1138. U.S. users care about privacy when it comes to general search services. Tr. 7471:5–25 (Raghavan (Google)) (People have cared increasingly about privacy, and Mr. Pichai had mentioned privacy as a focus at Google's 2019 I/O conference.); *id.* 7451:20–7452:21 (acknowledging prior statement that users should and will consider privacy when

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choosing a search engine and discussing research showing that users care about privacy); UPX1069 at -661–62 ("Privacy concerns are the biggest contributor" to declining user trust in the Google brand); Des. Tr. 156:21–24, 157:3–13 (Fox (Google) Dep.) ("[P]rivacy generally is a factor that some searchers are interested in and care about."); Tr. 2484:4–8 (Cue (Apple)) (Technology users have a significant interest in privacy.); UPX0720 at -249 (DuckDuckGo survey showing that "doesn't collect personal info" was top reason adult Americans switch search engines).

1139. Many Americans would like to avoid the harms associated with tracking by GSEs. Tr. 1943:3–1944:25, 1947:3–1948:20 (Weinberg (DuckDuckGo)) (explaining that "generally we find that a large percentage of Americans would like to avoid these harms" and describing the results of user surveys on privacy preferences).

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1141. Google does not perform well with users on privacy and trust. DX0183 at -892 (2020 Google study showing that Google had "weak performance scores" (24%) in the United States on top trust drivers "[r]espects my privacy" and "[k]eeps my personal data secure."); UPX0419 at -489 ("We saw significant trust declines in 2018 in Google specifically."); UPX0763 at -960 (Raghavan: "We (and I) felt the need to put a finer point on privacy this year, given it's where we've been getting hammered."); UPX0795 at -084 ("<20% of users think [Google] Search delivers on their expectation of privacy.").

1142. Users dislike Google's data storage policies and believe Google benefits more from those policies than they do. UPX0996 at -977 (2019 Google survey of 1000 users found 76% thought Google benefits more from storing users' information than users do and 68% felt negatively about the length of time Google stores data vs. 6% that did not.).

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1143. When assessing whether to pursue a potential privacy enhancement to Google Search, Google considers whether it is losing search queries or search revenue to rivals based on privacy. Tr. 7464:19–7465:12 (Raghavan (Google)) (Whether Google was losing queries to rivals because of privacy was one factor when deciding whether Google would pursue a privacy enhancement.); Des. Tr. 231:13–232:11, 232:13–21 (Edwards (Google) Dep.) (Discovering that a large number of users were switching to DuckDuckGo because of privacy would be a reason to more quickly launch a privacy change.); Des. Tr. 185:24–186:2, 186:5–15 (Fox (Google) Dep.) (discussing UPX0419 and explaining that working on privacy and user trust is a concern for Google especially if they could lose queries to another search engine); Tr. 5854:21–5456:14 (Whinston (Pls. Expert)) (Google considers the risk that it will lose business to competitors when it decides whether or not to pursue privacy initiatives.); UPX0810 at -410, -441 ("Key risks" for enhancing private search on Google include "revenue impact" and whether regulators or Apple could request private searching to be the default setting.); UPX0740 at -956–57 (Consumer council notes with an "Action Items" heading instructing Ms. Edwards to analyze the revenue impact of a potential privacy change.).

1144. For example, in 2019, Google identified ways in which DuckDuckGo offered better privacy features, but Google decided not to pursue privacy initiatives in the absence of competitive pressure. UPX0811 at -420, -445 (comparing privacy features between DuckDuckGo and Google). Google employees, including executives Nicholas Fox and Benjamin Gomes, suggested that Google could and should enhance its privacy offerings. Tr. 7469:6–9 (Raghavan (Google)); Des. Tr. 158:2–159:8, 160:23–161:16, 162:25–163:16 (Fox (Google) Dep.) (discussing efforts to improve Google's privacy offerings, specifically with features like auto deleting user data to "appeal more to people concerned about privacy."); UPX0794 at -146

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(comparison between Google and DuckDuckGo on various privacy policies); UPX0501 at -520 (June 20, 2019 e-mail from Mr. Gomes (Google) discussing proposal to meet privacy challenges from DuckDuckGo); UPX0500 at -518 (2019 email thread relating to DuckDuckGo and Google potentially pursuing additional privacy features).

1145. In response, Mr. Raghavan, who was on the Consumer Council and would later become head of Google Search, asked for data about "what impact is [DuckDuckGo] having on [Google's] search volume." UPX0500 at -518; Tr. 7466:1–7468:12, 7599:7–17 (Raghavan (Google)) (discussing UPX0500). Before enacting any additional privacy features, Dr. Raghavan stated he would need to see data about whether Google was actually losing queries to DuckDuckGo. Tr. 7468:2–12, 7599:7–17 (Raghavan (Google)); *id.* 7472:19–24 (calling DuckDuckGo "ankle biters").

1146. In a related email, Dr. Raghavan stated, "I agree that there's something worth exploring in this space of private search. But the working teams have to do MUCH more careful work before wasting our valuable time. I want to see evidence that that there's a real impact on Google users, attributable to this factor." UPX0501 at -520. Dr. Raghavan continued, "I disagree with a methodology that consists of conflating 'people care increasingly about privacy, DuckDuckGo is making a lot of noise about it, Sundar mentioned it in I/O' (all true statements) then concluding that this needs a product change." *Id.*

1147. Ultimately, Google did not bother conducting any studies or surveys to determine if Google was losing query volume to DuckDuckGo. Tr. 7472:6–13 (Raghavan (Google)) (Dr. Raghavan could recall no follow-up surveys.). As head of Google Search, Dr. Raghavan could have requested that such a study be done, but he did not. Tr. 7472:14–18 (Raghavan (Google)). This is an example of when Google decided not to pursue privacy initiatives in the

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absence of competitive pressure or a "threat of losing users." Tr. 5855:19–5856:14 (Whinston (Pls. Expert)).

1148. A 2019 presentation at Google proposed various privacy enhancements that Google could make, and identified privacy features that DuckDuckGo offered its users that Google did not. Tr. 7412:5–7413:2 (Raghavan (Google)) (discussing UPX0811); Tr. 4167:22–4171:10 (Juda (Google)) (discussing UPX0811); UPX0811 at -408, -420, -445. One privacy option proposed in the deck was an Incognito product for Google Search, i.e., a separate website (incognito.google.com) on which users could search with enhanced privacy. UPX0811 at -411 (Incognito.google.com would "[p]rovide strong PR privacy-moment that demonstrates Google forwardness."); UPX0768 at -159 (Mr. Fox stating "I like this idea" with regard to standalone Incognito website); UPX0732 at -243 ("Google Search incognito is a proposal that Google offers a version of search that can be reached on a standalone domain, such as incognito.google.com. . . . The biggest drawback is that Incognito mode cannot be made a default search setting.").

1149. The 2019 privacy presentation identified key risks associated with privacy enhancements, including revenue impacts of less than $[redacted] billion/year (if the privacy product's reach was limited) or more than $[redacted] billion (if the product became mainstream). UPX0811 at -410; UPX0009 at -470. Google was concerned it could lose billions of dollars in revenue if the privacy product was popular. Tr. 7473:14–7475:9 (Raghavan (Google)) (Google decided not to offer Incognito mode for Google Search in part because of concern that Google could lose billions of dollars in revenue if users searched in Incognito mode.); UPX0768 at -158–62 (2019 email thread discussing possibility of a standalone Google Search incognito website).

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1150. Ultimately, Google did not adopt the proposals in the 2019 privacy presentation. Tr. 7416:23–7417:3, 7474:7 (Raghavan (Google)); UPX6026 at -489 (written 30(b)(6) response: "Google has considered, but has not developed or implemented, certain other features or settings that could also be considered a component of some conceptions of an 'incognito' or 'private' search 'mode.'"). Today, Google does not offer a private browsing mode for Google Search, including for searches conducted on google.com, the Google Search Widget on Android phones, or the Safari address bar. Tr. 7473:6–16, 7475:6–21 ((Raghavan (Google)).

1151. Private browsing mode is far from the only privacy feature that Google might reconsider if there was more competition. Google has opted not to create preset privacy bundles of low, medium, and high privacy settings for users despite the recommendation of its chief marketing officer. Tr. 9060:6–9061:9 (Fitzpatrick (Google)). Google considered, but rejected, an easier way for users to choose how long their data is saved. *Id.* 9052:1–9054:16. Google has the capacity to better protect particularly sensitive user data, but has opted not to. *Id.* 9061:10–9063:12 (discussing UPX0981 at -847). Google has also opted not to add a VPN (virtual private network) to Incognito Mode. Tr. 9063:14–9068:10 (Fitzpatrick) (Google)) (discussing UPX0981 at -847).

1152. By default, Google logs and tracks search history for signed-in users for 18 months. Tr. 7454:8–15, 7459:20–23 (Raghavan (Google)); Des. Tr. 185:22–186:14 (Edwards (Google) Dep.) (User identifiers associated with search queries are "by default retained for 18 months."). These default settings ignore Google's research that shows 74% of Google's users prefer that Google store user data for one year or less. UPX0996 at -978; Tr. 9055:11–9058:7 (Fitzpatrick (Google)) (reviewing UPX0996 at -978); UPX0794 at -146 (chart comparing DuckDuckGo's and Google's privacy).

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1153. On Google, even if the user finds the default settings, the shortest auto-delete interval that a user can chose for their data is three months; 36 months is the only alternative Google offers. DXD-31 at 014. Google's research, however, shows that 49% of users prefer that data storage last no more than a month and 17% thought Google should not keep their data at all. UPX0996 at -978; Tr. 9055:11–9058:7 (Fitzpatrick (Google)) (reviewing UPX0996 at -978).

1154. By default, Google also collects and logs search history for signed-out users and Google ties that search history to a unique cookie assigned to the user's device or browser. Tr. 7456:16–23 (Raghavan (Google)); UPX6030 at -596, -598–99 (written 30(b)(6) response: "If multiple queries are associated with the same identifier, then they may be retained in that form for up to 18 months.").

1155. The search histories that Google logs and tracks include a user's search queries, the locations where they entered searches, the websites they clicked on, and granular interaction data such as their mouse movements, page hovers, and finger scrolls. Tr. 7460:2–7461:21 (Raghavan (Google)); UPX6026 at -469–70, -483 (written 30(b)(6) response).

1156. Before 2019, Google kept users' search history forever, with no option for users to have their search history auto deleted. Tr. 7461:22–7462:14 (Raghavan (Google)); Des. Tr. 186:22–187:9 (Edwards (Google) Dep.) (The retention of user identifiers was "indefinite.").

1157. Google offers an "Incognito mode" for Chrome, but this mode is not "truly private," which requires Google to describe it in "really fuzzy, hedging language." UPX0981 at -847.

1158. Google Search's privacy settings are hard to find and adjust. Tr. 9011:4–22, 9050:10–19 (Fitzpatrick (Google)) (Changing users' auto delete defaults takes as many as 10

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clicks.); Tr. 638:3–23 (Rangel (Pls. Expert)) (discussing "considerable choice friction" in changing Google's default privacy settings).

1159. Google violates privacy expectations by using personalized search history to target users with "creepy" advertisements, even when the users are not on Google Search. Tr. 7463:17–7464:7 (Raghavan (Google)) (Google monetizes user search history to personalize ads when the user is on YouTube, Gmail, and Google Discover); Tr. 3678:9–3679:16 (Ramaswamy (Neeva)) ("One of the most important ways a search engine knows its ads are effective is by observing [users'] behavior on other sites, especially sites on [the user has] clicked on the ads for. . . . [I]t leads to people having this vague sense of unease about their behavior being watched, or people use words like tracked."); Des. Tr. 231:20–232:7, 232: 10–13 (Baker (Mozilla) Dep.) (discussing UPX1070 at -313 and users' belief that "online tracking" is "creepy"); UPX0790 at -677 (quoting Google's then-CEO Eric Schmidt, "Google's policy is to get right up to the creepy line but not cross it."); Tr. 1943:3–1944:9 (Weinberg (DuckDuckGo)) (discussing harmful effects of Google's ad targeting). By contrast, Google rarely uses personalized search history to serve organic results. Des. Tr. 188:9–15, 188:17–190:19, 201:2–15 (Edwards (Google) Dep.) (Google Search is "extremely lightly personalized" and search history is only used "on a very small percentage of queries."); UPX1044 at -718 ("[P]ersonalization only rarely happens as part of the ranking process" because the query "generally provide[s] all that's necessary to deliver good results.").

D. Google Reduced The Quality And Increased The Prices Of Its Search Ads Products

1160. Due to reduced competition in the United States, Google has not implemented Search Ads launches or improvements that would have benefited advertisers. Tr. 5862:18–

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5863:13 (Whinston (Pls. Expert)) ("[W]hen Google doesn't face any competition, it sees itself losing revenue by doing these quality improvements for advertisers, so it doesn't do them.").

1161. Lack of competition reduces Google's incentives to respond to advertiser preferences, because advertisers lack a viable alternative to Google. Tr. 5859:20–5860:3 (Whinston (Pls. Expert)); *id*. 5862:18–5863:13 ("If Google face[d] competition and it doesn't do the quality improvements, it will lose advertisers to rivals. The whole calculus changes, and now the rational business decision when it faces competition is to do the ad launch . . . . [Competitive markets] force firms, they push firms [so] that their rational business decisions are to do things that are good for consumers; in this case advertisers.").

1162. As described in Section V.C.5.d., Google has regularly increased its Search Ad and Text Ad prices using various tuning mechanisms built into the ad auction. Google has made these changes without taking competition into account. Tr. 4292:14–16 (Juda (Google)) (Google does not analyze Bing pricing). In addition to being evidence of monopoly power, Google's ability to price without considering competitors is evidence that advertisers pay higher prices than would be paid in a more competitive marketplace. UPX0734 at -509 ("clever . . . auction pricing" comes "at a cost to advertisers"); Tr. 7555:17–20 (Raghavan (Google)) (discussing UPX0734); Tr. 6159:9–16 (Whinston (Pls. Expert)) ("[W]ith competitive pressure, Google would have, you know, stronger incentives to do things that are good for advertisers, and that could be quality improvements, and it could be price reductions, price reductions or not increasing price as much.").

1. Google Internally Ascribes Lower CPCs In Japan To The Fact That There Is Competition From Yahoo In Japan

1163. Google internally ascribes lower RPMs in Japan to the fact that Google faces competition from Yahoo in Japan. UPX0462 at -844 (one "take away" as to why RPMs are

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lower in Japan is that "Japan is unique, we have a big competitor unlike US and UK"); Tr. 1550:22–1552:4, 1554:19–1556:21 (Roszak (Google)) (discussing UPX0462).

1164. Unlike the United States, advertisers in Japan benefit from lower pricing because they can use Google's competitor (Yahoo) as an alternative. UPX0462 at -844 ("I'd highlight the competitive situation in JP [Japan]. JP is unique among our major countries in a sense that we have a player who competes against us head-to-head, Y!J [Yahoo Japan] (even though we surpassed Y!J in search revenue ~2 years ago). Advertisers split their search budget to Y!J and Google, which makes the auction pressure on Google less. So I don't think it's much apple-to-apple to compare RPM in JP against RPM in US/UK where we don't have competitors like Y!J, and I've rather compared our RPM against Y!J's (even though we need to make lots of assumptions to estimate it)"). Reduced auction pressure in Japan reduces CPCs. *Supra* ¶ 622.

a) Google Offered Advertiser-Friendly Incentives In Japan When Faced With Competition From Yahoo

1165. Google offered advertiser-friendly incentive programs when responding to unique competition in Japan. In approximately 2010, Google faced, from Yahoo Japan, a meaningful competitive threat for Search Ads. Google, accordingly, implemented an "incentive program" called "JIP [Japan Incentive Program] Search," which effectively operated as a Search Ads discount program aimed at ad agencies. UPX0057 at -846; Tr. 5860:4–5861:6 (Whinston (Pls. Expert)) (presenting UPXD104 at 80 (citing UPX0057 at -846)).

1166. Google implemented JIP Search to "help [its] competitive position against Y! who used to be the largest player in the Japan online ads market and offered an incentive program for agencies." UPX0057 at -846; Tr. 5860:4–5861:6 (Whinston (Pls. Expert)) (presenting UPXD104 at 80; citing UPX0057 at -846)); UPX0785 at -890 (JIP Search provides

[redacted]

"[n]on-standard incentives"; "[r]ationale" is that "[w]e have unique competition against Yahoo in Japan").

1167. Google began phasing out the JIP Search incentive program after its market share grew in Japan and it had "less reason to have JIP Search from the competition perspective." UPX0057 at -846. In 2014, Google surpassed Yahoo Japan's search revenue and, as of 2020, Google exceeded Yahoo Japan by approximately three times. UPX0057 at -846. Accordingly, Google began diminishing the scope of JIP Search and, in 2020, was planning to sunset the product. UPX0057 at -846; Tr. 5860:4–5861:6 (Whinston (Pls. Expert)); UPX0053 at -982 ("our intent is actually to *terminate* JIP Search in the future") (emphasis in original).

1168. Google considered expanding the Japan Incentive Program to the United States, but did not do so. Tr. 5860:23–5861:6 (Whinston (Pls. Expert)) (describing failure to expand JIP-like program to the United States); UPX0053 at -982 (discussion on expanding JIP search outside of Japan and stating "[r]egarding search incentives, that was something Scott brought up during the discussion, to potentially temporarily increase/introduce search incentives but Philipp [Schindler, Google's Sr. VP & Chief Business Officer] didn't really engage much (pointing to how difficult it usually is to get rid of incentives once we have them), and the discussion moved [on]. I don't think this topic will get much traction.").

2. Google Reduced Advertisers' Visibility Into Their Own Ad Spend And Performance

1169. Over time, Google has steadily reduced the granularity and visibility it provides advertisers into their own ad spend and performance, reducing the quality of Google's ad products.

[redacted]

a) Google Reduced Advertiser's Visibility Into Their Own Ad Spend Through Changes To Search Query Reports

1170. Google's search query reports (SQR) identify the queries matching the advertiser's ads, the average CPC for those ads, the total amount spent, and other metrics. UPX0526 at -538 (SQR background and excerpt); Tr. 4864:23–4865:16 (Lim (JPMorgan)); Des. Tr. 161:2–11 (Alberts (Dentsu) Dep.) (SQRs show specific queries matching keywords.); Tr. 5468:22–5469:8 (Jerath (Pls. Expert)) (discussing UPXD103 at 35; showing excerpt from Google Ads Help webpage)). Advertisers have no other means of acquiring this information. UPX0987 at -127 ("Particularly given the rise of close variants over the last couple of years, advertisers have increasingly been reliant on search query reports to find poor matches and prevent them with keyword negatives. Any limitations to how many queries are being reported is an obstacle to such control.") Information, such as that in the SQR, is a quality aspect of the product purchased by advertisers. By deciding what data is in the SQRs, Google controls what advertisers know about their ad spend. Tr. 5469:18–5470:6 (Jerath (Pls. Expert)).

1171. SQRs are "widely used by advertisers of all segments." UPX0526 at -539. Advertisers use SQRs to optimize their ad campaigns, including by (1) analyzing keyword performance, (2) adjusting bid strategies, and (3) identifying poorly performing queries. Tr. 5469:9–17 (Jerath (Pls. Expert)); UPX0926 at -691–93, -700–01 (IPG training materials explaining how to use SQRs); UPX8035 at .001 (Google Ads Help webpage: "Evaluating ad performance on the Search Network," advising that "[t]racking statistics like clicks and impressions is a great way to start"); UPX0058 at -771 (advertisers use SQRs for "[u]nderstanding [] what queries they are appearing against," "[m]ining for negative keywords," [c]reating more tightly themed ad groups and adding new keywords," and "[c]hecking their agency's targeting," among other things); UPX0532 at -567 (Google "Comms Doc" discussing

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SQR uses). For example, JPMorgan uses SQRs "to inform how [one] keyword or keyword set is performing relative to another," "to understand which keywords are driving the most value for the firm," and "to inform whether or not we need to increase or decrease budgets against certain keywords." Tr. 4865:17–23, 4866:6–9 (Lim (JPMorgan)). Other advertisers do the same. Tr. 3846:23–3847:12 (Lowcock (IPG)) (SQRs assist in determining the keywords to bid on and evaluating their effectiveness.); Des. Tr. 161:12–162:6 (Alberts (Dentsu) Dep.) (SQRs are used "to determine if we should add new keywords . . . or if we should omit keywords . . . via negative keyword additions.").

b) Google Harmed Advertisers By Removing The "One-Click Threshold" From The SQR

1172. In September 2020, Google reduced the information provided in SQRs by including fewer queries and by providing advertisers less data and details about their ad spend. Tr. 5469:18–5470:6 (Jerath (Pls. Expert)); Tr. 3849:14–19 (Lowock (IPG)) (Google has deprecated or limited certain types of information available in SQRs.); Des. Tr. 213:13–214:6 (Alberts (Dentsu) Dep.) (Post-2020 SQRs "not as granular and comprehensive of a list as what we used to have.").

1173. In particular, Google removed the SQR's "one-click threshold," where the SQR included any query resulting in an ad click, even if only clicked once. Tr. 5473:25–5474:22 (Jerath (Pls. Expert)) (discussing UPXD103 at 36; citing UPX0526 at -545, -549); Des. Tr. 173:20–174:3 (Alberts (Dentsu) Dep.). Post-change, Google also omitted any query from the report if it received less than "[redacted], even if the query received ad clicks." UPX0532 at -566–67. Google did not disclose the new [redacted] threshold to advertisers. UPX0532 at -568 (Google "Comms Doc" stating Google does not reveal the threshold number for inclusion in SQR); Tr. 5222:2–19 (Booth (The Home Depot)) (unaware

[redacted]

of the threshold); Des. Tr. 166:17–25 (Alberts (Dentsu) Dep.) (does not know the threshold and does not recall Google ever sharing this information); UPX0058 at -772 (Google also did not disclose the previous lower threshold of [redacted].).

1174. Google subsequently charged advertisers for ads displayed on certain queries without telling the advertisers what those queries were, what the average cost per click was, or what the total spend for each of those queries was. Tr. 5469:18–5471:12 (Jerath (Pls. Expert)) ("[Advertisers] were buying certain queries but they were not being told what they're buying, which queries they're buying"; "[T]his is like if you buy a product in a supermarket but they don't tell you what you actually bought."); Tr. 5174:9–25 (Booth (The Home Depot)) (SQR changes led to loss in visibility of CPC data.).

1175. The SQR deprecation ultimately concealed anywhere from 20% to greater than 28% of an advertiser's paid search spend on Google. Tr. 5471:14–5472:1 (Jerath (Pls. Expert)) ("[A] broader study . . . estimated [the figure] to be about 28 percent of ad spend," while "in [his] personal experience with certain advertisers, [he saw] numbers even greater than that"); Des. Tr. 168:25–169:3, 169:7–12, 169:21–170:12 (Alberts (Dentsu) Dep.) (SQR change resulted in "measurable impact" in terms of the loss "of our visibility into a percentage of queries that were driving costs and clicks[.]").

1176. For example, JPMorgan saw an increase from only 5% of keyword performance not being visible at the keyword level, "to roughly 20 percent" not being visible. Tr. 4866:9–4868:5 (Lim (JPMorgan)). Tinuiti, an advertising agency with a focus on digital marketing, saw "a significant drop in the share of spend attributed to search queries across ad formats and device types from August to September" among dozens of advertising clients spending millions on Google Search Ads. UPX0987 at -124–26.

[redacted]

1177. Google's SQR changes impede advertisers' ability to assess and optimize their ad spend and manage their costs. Tr. 5475:2–5476:1 (Jerath (Pls. Expert)) (discussing UPXD103 at 37–39, showing excerpts of UPX0983 at -162–63, UPX0987 at -124–26, and UPX0511 at -611). Advertisers use data in the SQRs to identify queries on which they do not want to bid or appear and identify "negative keywords" to use to avoid appearing on those queries. Tr. 5469:9–17, 5472:11–5473:3 (Jerath (Pls. Expert)) (Advertisers used SQRs "to ex post figure out that, well, I don't want this query, I want to exit this particular auction."); Tr. 5171:23–5172:15 (Booth (The Home Depot)) ("[SQRs] also help[] us understand, are there certain things that we wouldn't want to be bidding on . . . ."); UPX0926 at -691 (importance and use of negative keywords); Des. Tr. 131:13–133:6 (Alberts (Dentsu) Dep.) (Visibility reveals keywords that the advertiser wants to suppress.).

1178. If an advertiser does not know that its ad is being matched to certain queries, the advertiser cannot avoid those queries. Tr. 5472:11–5473:3 (Jerath (Pls. Expert)) ("[W]ithout knowing which queries you're being matched with, you can't exit these auctions."); Tr. 5172:20–5174:20 (Booth (The Home Depot)) ("[L]ess information didn't allow us to be as thorough in what we would -- would have otherwise done.").

1179. Advertisers understand how the reduction in SQR visibility harms their ability to identify and use negative keywords. *Supra* ¶ 1172. Advertising agency Tinuiti observed, "[t]his is a massive decrease in query visibility, making it more difficult for paid search marketers to effectively identify poor-matching queries to weed out via keyword negatives." UPX0987 at -126. Bank of America similarly noted that Google's September 2020 change to SQRs would "inhibit advertisers from being able to weed out click and mismatched intent." UPX0983 at -163.

[redacted]

1180. On average, advertisers' inability to avoid auctions leads to thicker auctions and higher prices. Tr. 5472:11–5473:3 (Jerath (Pls. Expert)) ("So on average, what this would lead to is advertisers entering more auctions, which leads to thicker auctions, that is more participants in the auction, which would then lead to higher prices."); *supra* ¶¶ 622–623.

1181. Other industry participants noted that Google's changes in SQRs otherwise impeded advertisers' ability to assess and optimize their ad spend and manage their costs. Tr. 4865:17–23, 4868:7–10 (Lim (JPMorgan)) (Google's changes "gave my team less information to work with."); UPX0987 at -126 (According to Tinuiti, the loss of query visibility "also makes it more difficult to identify new query variations driving traffic which might be performing well and should be launched as new keywords.") Des. Tr. 156:12–22, 157:3–158:2, 158:4–159:12 (James (Amazon) Dep.) ("So when the search query report changes were made, it limits the amount of information that we can have related to the number of unique search queries that occur for a [] given term and the number of keywords that are in our auction that would have triggered as a result of that"; "It impacts optimization insofar as there may be areas where we should be creating text ads to target very specific search queries where we may be able to capture more queries and to do so in a more refined way."); UPX0511 at -611 ([redacted]).

[redacted]

1182. Even before making the September 2020 changes to SQR reports, Google recognized that the changes would result in substantial data loss to advertisers. UPX0526 at -545 (internal Google presentation warning that "Customer relations: Data loss from SQR will be substantial if 1-click clause is removed"); Tr. 5473:25–5474:22 (Jerath (Pls. Expert)) (discussing UPXD103 at 36). Google further recognized that the "[r]isks of showing less data in SQR[s]" included "[d]isrupt[ing] keyword harvesting algorithms or negative keyword setting workflows" and "[s]maller advertisers los[ing] more data [therefore making] Google Ads [] harder to use." UPX0058 at -779.

c) Google's SQR Changes Exacerbate Harm Caused By Changes To Keyword Match Types

1183. Google's September 2020 changes to its SQRs exacerbated issues, *supra* ¶¶ 609–626 (§ V.C.4), related to expanded keyword match types. As described more fully there, beginning in 2012, Google changed its keyword match types to reduce the precision with which advertisers could target queries and denying advertisers the option to opt out of the changes. Although Google advised advertisers to use negative keywords to deal with the expansion, *supra* ¶ 618, Google's September 2020 changes to the SQR hobbled advertisers' ability to identify appropriate negative keywords, exacerbating the issues surrounding the expanding match types. Tr. 5482:18–5483:9 (Jerath (Pls. Expert)) ("[T]hat's the related problem that, as an advertiser, I'm being opted into these expansions, [] and I'm matching some of them. But in my search query report, I don't have data on all the queries I'm being matched to. So how am I supposed to come up with negative keywords if I don't even know what all am I being matched to."); Des. Tr. 157:14–17, 157:20–158:4, 158:20–160:22 (Alberts (Dentsu) Dep.) (match type expansions meant that its teams "needed to rely on those search query reports more frequently" to identify whether clients were subject to unwanted or inappropriate matches, so that it could "take action

[redacted]

by either blocking keywords, pausing keywords, or incorporating negative keywords which will suppress the instances . . . match[es] to a particular term.”).

1184. Google’s changes to SQR reporting and match-type expansions reflect a slow erosion over time of advertisers’ ability to control and manage their ad spend, with the effect of higher prices to advertisers. Tr. 5494:11–5495:7 (Jerath (Pls. Expert)) (“Google restricts what advertisers can know about their own ad spend []. So you’re spending money but don’t know where it’s going. This was the example of [] removing data that was previously provided in the search query reports, and along with making things more difficult to opt out of through the negative keywords. So all of this together, as I’d explained, leads to thicker auctions, and higher ad prices and unwanted ad spend by advertisers. So higher ad price is the important point here”; discussing UPXD103 at 45); UPX0511 at -619 (Amazon internal document outlining the “[s]low erosion of channel control” following Google’s changes over the years, including to keyword matching and SQRs); *id.* (“Google has removed and reduced the granularity of reporting data they make available”); Des. Tr. 160:18–162:20 (James (Amazon) Dep.) (discussing UPX0511).

d) Google Harmed Advertisers By Removing “Average Position” Metrics From The SQR

1185. Before September 2019, Google’s SQRs included “average position” metrics, which would tell the advertiser the average position on the SERP in which each of their ads was showing (i.e., between 1 and 4), as well as how a given ad’s position trended over time. Tr. 5175:14–5176:2, 5200:17–5201:2, 5202:3–5 (Booth (The Home Depot)) (describing former ad position metrics); Des. Tr. 152:14–153:7 (James (Amazon) Dep.) (describing ad position metrics previously available in SQRs); UPX8037 at .001 (A Google Ads Help webpage on ad position metrics explained that “[a]verage position reflect[ed] the order that your ad appear[ed] versus the other ads in the ad auction.”).

[redacted]

1186. Google has removed and replaced average position metrics with a less granular and less useful metric, again reducing the quality of Google's reporting and impeding advertisers' ability to assess their ad spend and manage their costs. UPX0511 at -619 ("In addition, Google has removed and reduced the granularity of reporting data they make available (position indicators, reduction in quality of SQR data, etc.)."); Des. Tr. 226:7–227:7 (Alberts (Dentsu) Dep.) (Average ad position is a common metric used by advertisers to optimize spend, and the solutions introduced after the deprecation of average position are less useful.).

1187. Advertisers used the average position metrics as an input when modeling the impacts of bidding changes and optimizing their bids. Tr. 5176:3–11 (Booth (The Home Depot)) ("It helps us understand where we show up on the search results page . . . ."); Des. Tr. 150:24–151:19, 152:14–153:7 (James (Amazon) Dep.) (Average page rank could be an input into bidding optimization.). The advertiser could identify if there were opportunities to appear higher on the SERP and modify their bids accordingly. Tr. 5176:6–11 (Booth (The Home Depot)). Or, the advertiser could determine that they are already bidding at a sufficient level for where they want their ad to appear. Des. Tr. 40:10–21 (James (Amazon) Dep.).

1188. Alternatively, the advertiser could determine that it would be more cost-effective and yield a better return on investment for their ad to appear in a lower position on the SERP—e.g., in the second ad slot rather than the first one—and therefore lower their bid to aim for a lower average position. Tr. 5176:12–5177:1 (Booth (The Home Depot)) ("Not always would we want to be in the very absolute position of 1.0. With that typically comes a cost per click premium. And so if we would identify that we're always in a position of 1.0 or 1.1, it's like, ooh, maybe we don't need to be that aggressive in our bidding and we could lower our costs per clicks, lower our bid to essentially generate a stronger return on advertising."); Des. Tr. 40:22–

[redacted]

25, 152:14–153:7 (James (Amazon) Dep.) ("[With average position metrics,] we could understand as, for example, an ad moves from position one to position two in the search results, if we see a higher ROI in position two, which is entirely possible, versus being in position one.").

1189. In November 2018, Google introduced "impression metrics," which report only what percentage of an advertisers' ads appear in one of the top positions on a page and what percentage appear in the first position. UPX8037 at .001 (Google Ads Help webpage on ad position metrics). Google initially continued to provide average position metrics alongside impression metrics, but in September 2019, Google ceased providing average position metrics. UPX8031 at -085; DX2021 at .001. Advertisers can no longer tell the allocation of their ads between positions 2, 3, and 4. Tr. 5175:14–5176:2, 5221:1–5222:2 (Booth (The Home Depot)).

1190. Google's new impression metrics, however, did not provide the same information that the average position metrics did. Des. Tr. 152:8–153:7 (James (Amazon) Dep.) ("[W]e end up with a relative metric in terms of how often our ad was showing up in the top position, but doesn't give us a strong signal in terms of where it might be otherwise on the page at the time."); Tr. 5221:2–5222:1 (Booth (The Home Depot)) (The new impression metrics "[do] not give us the absolute number of the position or average position, no."). They were thus less helpful to advertisers, impacting their ability to optimize ad spend. Des. Tr. 153:8–13 (James (Amazon) Dep.) (Google's removal of average position metrics from SQRs impacted Amazon's ability to optimize ad spend); Tr. 5177:2–15 (Booth (The Home Depot)) ("[T]he more information that we get, I think the more intelligent we can be with our ad buying. I don't know if it was catastrophic -- it certainly wasn't catastrophic. But the types of insights that we would get, we wouldn't have the same specificity.").

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1191. Amazon—which spends more than $[redacted] billion per year on Google Search Ads—pushed back on the removal of average position metrics from SQRs, but Google nevertheless proceeded with the change. Des. Tr. 41:1–22, 151:20–152:7 (James (Amazon) Dep.) (discussing UPX0061 and later referring to his team's push back); UPX0061 at -437 (internal Amazon email with notes for an upcoming Google meeting: "[T]hey are continually reducing the quality of reporting data we are getting. I am continually arguing with them to give us visibility to the metrics that allow for us to understand our business drivers.").

1192. In contrast to Google's SQR changes, Microsoft provides richer reporting on Bing Search Ads. Des. Tr. 41:23–42:19 (James (Amazon) Dep.) ("We have more information, richer reporting information that we get from Bing relative to what we see from Google.").

IX. GOOGLE ADOPTED POLICIES FOR DESTROYING OR HIDING DOCUMENTS TO AVOID PRODUCING THEM TO REGULATORS AND LITIGANTS

A. Google Adopted And Implemented An "Off The Record" Chats Default To Destroy Substantive And Relevant Written Communications

1. Google's Chat Products

1193. Google Chat, previously known by names such as "Hangouts" and "Google Talk," is Google's instant messaging product. Tr. 967:6–8 (Kolotouros (Google)); Tr. 7728:20–25 (Pichai (Google)). Google has used these chat products for business purposes for over 15 years. UPX1088 at -652 (Google Chat retention policy); UPX1101 at -619 (referring to Google's "instant message culture" in September 2008).

1194. Chats are discoverable written communications that may take place one-on-one, with several others, or in virtual "rooms" containing two or more people. UPX1101 at -619 (Instant messages are a "form[] of electronic communication" that are subject to review in legal discovery.); UPX2091 at -584 ("Assume that every document you generate, including email and

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chats, could be made public and scrutinized by our competitors and antitrust regulators."); UPX1088 at -652 (listing types of chats). Google Chats may include non-employees. Tr. 972:20–25 (Kolotouros (Google)) (unaware of policy regarding chats with individuals outside Google).

1195. Google employees interchangeably refer to "history off" chats as "off the record" chats. Google permanently deletes all "off the record" communications after 24 hours if both users in a one-on-one chat have their retention history set to "off," or if history is set to "off" in a group chat. Tr. 968:8–18 (Kolotouros (Google)) ("history off" chats deleted every 24 hours); Tr. 7729:3–8 (Pichai (Google)) (same); Tr. 7559:1–3 (Raghavan (Google)) ("[E]very chat disappeared 24 hours later."); UPX1088 at -652.

1196. Google's enterprise administrator sets the default retention period for Google Chat. PSX01217 at 2. The retention period for chats can be set for any duration, from one day to indefinite. PSX01217 at 2; Tr. 7590:24–7591:12, 7592:24–7593:16 (Raghavan (Google)). Google chose to set its default retention period to 24 hours for "history off" chats. UPX1088 at -652; UPX1089 at -654. After a chat's retention period expires and the chat is removed from the user's view—such as "off the record" chats disappearing from view after 24 hours—the chat "can't be recovered back into [the user's] view." UPX1088 at -652; Tr. 7559:1–3 (Raghavan (Google)) ("[E]very chat disappeared 24 hours later.").

1197. Turning a chat's history from "off" to "on" retains all subsequent messages between the chat participants but does nothing to preserve messages sent before the switch to "on." All messages sent before that change are still deleted after 24 hours. UPX1088 at -652.

2. In September 2008, Google Changed The Default Retention Setting For Many Chats To "History Off"

1198. Before September 2008, Google chats defaulted to "history on" and were preserved for longer than 24 hours. Tr. 7729:9–12 (Pichai (Google)).

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1199. On September 16, 2008, Google changed the default retention of chats to "history off" so that chats would, by default, delete after 24 hours. UPX1101 at -619–20. In an email to all Google employees from now-Chief Legal Officer Kent Walker and another senior Google leader, Bill Coughran, Google announced that to "streamline and simplify" the process of reviewing and "producing documents in regulatory and litigation matters" and "[t]o help avoid inadvertent retention of instant messages," Google had "decided to make 'off the record' the Google corporate default setting" for chats. UPX1101 at -619–20; Tr. 7730:3–7731:7 (Pichai (Google)). Google's 2008 decision to default chats to "history off" was made by executive management, including Mr. Walker, for purposes of avoiding discovery in litigation and regulatory matters. Tr. 7733:24–7734:7 (Pichai (Google)) (agreeing that "the executive management group" chose to "automatically delete chats after 24 hours" in 2008, even though those deleted chats "may have otherwise been collected and produced in litigation discovery and in regulatory matters").

1200. Google maintained its policy to default chats to "off the record" for nearly 15 years, from mid-September 2008 through early February 2023. Tr. 967:9–11 (Kolotouros (Google)); Tr. 7558:22–24 (Raghavan (Google)); Tr. 7734:13–15 (Pichai (Google)) (referring to UPX1101 at -619); Plaintiffs' Memorandum In Support Of Motion For Sanctions, ECF No. 495–6 (notifying Plaintiffs of the change to chat retention default to "history on").

3. For Years, Including Throughout Discovery In This Case, Google Employees Used "Off The Record" Chats To Conduct Business

1201. Google has "an email and instant-messaging culture." UPX1101 at -619. Google employees use Google Chat daily to communicate with colleagues. Tr. 970:7–10 (Kolotouros (Google)) (testifying that he uses chat multiple times a day); Tr. 6467:17–25, 6468:10–12 (Nayak (Google)) (referring to use of chat); Tr. 7558:15–17 (Raghavan (Google)) (same);

[redacted]

Tr. 7737:1–3 (Pichai (Google)) (same); UPX1094 at -485 (chat with Mr. Pichai discussing New York Times story about ChatGPT).

1202. Google employees use Google Chat to discuss substantive business with co-workers and supervisors, and sometimes with individuals working at other companies, such as employees at Samsung. Tr. 966:14–16, 970:11–12, 971:2–7, 971:20–22, 972:6–8 (Kolotouros (Google)); Tr. 7562:5–12 (Raghavan (Google)); Tr. 9557:14–19 (Rosenberg (Google)); UPX1099 at -146 (chat between Samsung and Google employees, with Google's Christopher Li advising Samsung employees that he had changed chat history to "on" and "please communicate with care given this").

1203. Google employees at all levels of responsibility—from the CEO to vice presidents to product managers—use "off the record" chats for business purposes. Tr. 7737:1–3 (Pichai (Google)) (testifying to use of chat); Tr. 7560:7–7562:22 (Raghavan (Google)) (discussing UPX0714); UPX0714 at -202 ("So I kind of let them have it on both barrels on a History-off chat msg"); Tr. 6467:17–6468:12 (Nayak (Google)); Tr. 968:22–969:2, 971:8–11 (Kolotouros (Google)); Tr. 9557:4–9558:15 (Rosenberg (Google)) (discussing UPX2111 at -097 and his use of history off chat to discuss Samsung revenue share payments on the Play Store); Tr. 4335:20–25 (R. Krueger (Google)).

1204. Mr. Pichai admitted that when he used chats, he would occasionally request that chats be set to "history off." Tr. 7738:15–7739:13 (Pichai (Google)) (testifying about UPX0973); UPX0973 at -443 (asking to make a group chat "history off").

1205. Mr. Raghavan, Senior Vice President of Search Ads, used "off the record" chats, including to express his unfiltered views to colleagues on changes to the Chrome user interface. Tr. 7560:7–7562:22 (Raghavan (Google)) (discussing UPX0714); UPX0714 at -202 (letting

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Google Senior Vice Presidents Hiroshi Lockheimer and Ben Gomes, and Vice President Anil Sabharwal, "have it on both barrels on a History-off chat mg" about how a change to Chrome affected Mr. Raghavan's Search Ads group); UPX8082 at ¶ 5 (Raghavan declaration stating his "typical practice" was to have the chat default set to "history off").

1206. Mr. Rosenberg, Former Senior Vice President, and Mr. Kolotouros, current Vice President, used "history off" chats to discuss Samsung revenue share. Tr. 971:8–11 (Kolotouros (Google)); Tr. 9557:4–9558:15 (Rosenberg (Google)) (discussing UPX2111 at -097); Tr. 968:22–969:2 (Kolotouros (Google)); UPX8071 ¶ 4 (Kolotouros declaration stating his "typical practice" was to have the chat default set to "history off"); *id.* ¶ 5 ("I do not recall [] changing the history setting of any Google chat").

1207. Ryan Krueger, SA360 Product Manager, used "history off" chat for "both formal and informal discussions," including business-related communications to discuss "SA360 product decisions" and "product feature road map decisions." Tr. 4334:14–20, 4335:20–25, 4336:10–4337:1, 4338:5–9, 4338:19–24 (R. Krueger (Google)). Likewise, Amit Varia, SA360 Senior Product Manager, also routinely used chat to discuss SA360's feature "prioritization process" and "roadmap planning." Tr. 4703:23–4704:9, 4706:21–4707:22 (Varia (Google)).

4. Google Employees Intentionally Took Chats To "History Off" To Avoid Preserving Them

1208. Google had a policy that its employees should communicate with "history off." To comply with this policy, Google employees asked coworkers to turn their history off when using chat. Tr. 6468:4–9 (Nayak (Google)) (he "certainly" asked people to turn their chats to "history off" because "at the time there was a policy at Google to have history off . . . And I just wanted to be compliant with that policy.").

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1209. To ensure communications could not be produced in discovery, Google employees proactively asked coworkers to change their chat settings to "history off" to conduct substantive and sensitive business conversations. Tr. 7737:7–19 (Pichai (Google)) (testifying he asked for group chats to be set to "history off"); Tr. 4338:19–24 (R. Krueger (Google)) (agreeing that he had "certain conversations related to [his] work with SA360 for which [he] turned history off" affirmatively); UPX0708 at -402 ("BTW, can we turn history off by default in this chat room?").

1210. Google employees were aware the chats were "history off." Tr. 7560:7–7562:22 (Raghavan (Google)) (letting senior Google executives "have it on both barrels on a History-off chat" message about changes made by the Chrome team affecting the Search Ads team) (referring to UPX0714).

1211. As CEO, Mr. Pichai never considered changing the chat default retention period to anything other than 24 hours for "history off" chats. Mr. Pichai understood that he has an obligation to preserve relevant chat messages and that "it's possible" there were chats where he asked to turn history off. Tr. 7736:14–25 (Pichai (Google)) (contending that he relied "on our chief legal officer and the legal teams" to meet Google's obligations to preserve documents in connection with litigation, and did not consider whether the chat retention period was adequate); Tr. 7741:16–7742:9 (Pichai (Google)) (if chats were set to "history off," they would not be preserved).).

5. Google Employees Did Not Change Their Default Chat Retention Settings, Even When Under A Legal Hold

1212. Google has the technical capability to override default retention rules and set legal holds for all employees' chats. Legal holds can be applied to individual accounts or to all accounts in an organization. Tr. 7591:22–7592:23, 7594:4–7595:6 (Raghavan (Google));

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Tr. 7587:18–7588:25 (Raghavan (Google)) (explaining Google Workspace and its components); PSX01217 at 3 (legal holds preserve all "employees' [] Chat conversations, whether they take place via direct message or in rooms."); PSX01217 at 2 (explaining Google Vault capabilities); PSX01218 at 1 ("Holds override retention rules, so data on hold is protected from your standard information governance rules that might purge it otherwise.").

1213. Before February 8, 2023, Google's corporate policy was to automatically preserve "on the record" chats for those on legal hold, but not "off the record" chats for those same people. Rather, by corporate policy, "history off" chats for individuals on legal hold continued to be deleted every 24 hours. "History off" chats were only retained if employees overrode the chat default and proactively switched a discussion to "history on," or otherwise saved the chat by (for example) emailing it. Tr. 968:19–21 (Kolotouros (Google)) (referring to UPX1088); UPX1088 at -652 (explaining retention periods for types of chats); Tr. 7729:3–8 (Pichai (Google)) (chat default was "history off" until February 2023).

1214. Google employees on legal hold used "history off" chats to discuss matters related to this litigation. Tr. 973:5–9, 974:10–975:2, 983:7–12 (Kolotouros (Google)) (referring to UPX0710) (Mr. Kolotouros asked to take a conversation regarding Samsung Wear Play revenue share "off email" and onto "chat/messaging/hangouts" when wearable technology, such as Samsung Wear was part of the Amended Complaint.); ECF No. 94 at ¶ 162 (Amended Complaint dated Jan. 15, 2021); UPX0710 at -209 ("there is another reason why I think 50% is a good number...best discussed off email so feel free to ping me via [chat]").

1215. Google employees were not adequately trained on the scope of their litigation holds and were not aware of what materials should be retained. Mr. Kolotouros, for example, "d[id] not recall" if wearables were part of his litigation hold in this case, although wearable

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technology was part of the Amended Complaint. Tr. 983:7–12 (Kolotouros (Google)); UPX0710 at -209; ECF No. 94 at ¶ 162 (Amended Complaint dated Jan. 15, 2021); Tr. 4338:25–4341:1 (R. Krueger (Google)) (testifying that he "interpreted" his legal hold not to cover "history off" chats because they were "informal" conversations that were "free form" rather than "well thought out and reviewed").

1216. Although aware that they were on legal hold—and indeed, often multiple legal holds—Google employees did not change their chat default settings to preserve relevant chats. Google employees knew that by keeping the default as "history off," chats would be deleted every 24 hours. Tr. 6467:17–6468:2, 6468:10–12 (Nayak (Google)); Tr. 956:18–23, 968:22–969:2, 969:5–6, 970:2–6, 974:24–975:2, 975:7–9 (Kolotouros (Google)) (keeping chat default "history off" before February 2023, despite being on more than one legal hold, including this case since December 2019); Tr. 4337:2–5 (R. Krueger (Google)); Tr. 7559:4–11 (Raghavan (Google)); Tr. 9558:5–15 (Rosenberg (Google)); Tr. 7734:19–22, 7737:4–6 (Pichai (Google)) (did not take any steps to change Google's default chat policy during his time as CEO)); Tr. 4703:23–4704:9, 4706:21–4707:22 (Varia (Google)) ("was relying on the default settings" of Google chat even after placed on legal hold); UPX0204 at -200 ("My email and docs are currently retained in connection with four different lawsuits").

1217. Google's history-off chat policy was well known throughout Google. Google's CEO, Mr. Pichai, "was aware" when he became CEO that "all Google employees, even those under a litigation hold, had their chats default to delete after 24 hours." Tr. 7736:9–13 (Pichai (Google)).

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6. After Keeping Its 24-Hour Chat Default Policy In Place For 15 Years, Google Changed Its Chat Retention Policy Only After Plaintiffs' Expressed Intention To File For Sanctions

1218. The complaint was filed in this litigation on October 20, 2020. Complaint, ECF No. 1.

1219. On November 18, 2020, Google issued a new chat retention policy. Tr. 968:5–7 (Kolotouros (Google)) (referring to UPX1088); UPX1088 at -652 ("Policy last modified: November 18, 2020"); ECF No. 529 at 16 (Google response to DOJ sanctions motion, agreeing that Google enacted a standalone chat policy in November 2020). The new chat policy did not set the default to "history on" and instead continued to delete employees' "history off" chats every 24 hours. UPX1089 at -654 ("No change 24 hour [deletion] if message history is off (default)"). Google reissued its policy multiple times during the pendency of the litigation. UPX1090 at -656 ("page last modified: February 26, 2021"); UPX1091 at -658 ("page last modified: October 1, 2021"); UPX1088 at -652 ("page last modified: February 25, 2022").

1220. The United States informed Google that it intended to move for spoliation sanctions on February 1, 2023, for Google's destruction of relevant "off the record" chats throughout discovery in this case. United States' Motion for Sanctions Against Google, LLC and an Evidentiary Hearing to Determine the Appropriate Relief, ECF No. 495 at Ex. 46. Seven days later, on February 8, 2023, Google changed its chat default settings and began to default chats to "history on" for individuals on legal hold. Tr. 7729:3–8 (Pichai (Google)); UPX8071 at ¶ 4; Memorandum in Support of the United States' Motion for Sanctions Against Google, LLC and an Evidentiary Hearing to Determine the Appropriate Relief, ECF No. 495–1, Ex. 4 at 2 (confirming that Google began retaining chats for individuals on legal hold). By the time Google began preserving chats for individuals under legal hold, fact discovery in this case had been

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closed for 9 months. Order Amending Case Management Order, ECF No. 263 at 1 (setting May 6, 2022, as the end of fact discovery).

1221. "History off" chats that occurred during the investigation preceding this litigation, and throughout discovery in this litigation, were irrevocably destroyed. UPX1088 at -652 ("history off" chats deleted after 24 hours); Memorandum in Opposition to Plaintiffs' Motion for Sanctions, ECF No. 529 at 4 ("Messages sent with 'history off' are deleted 24 hours from when the message is sent, and cannot be retained via Google Vault.").

B. Google Trains Its Employees To Shield Emails And Other Documents From Review And Production In Investigations And Litigation

1. Google Trains Employees To Always Copy An Attorney When Discussing The MADA Or The RSA, And Google Employees Follow That Advice

1222. Google has long trained its employees to include attorneys on "any written communication regarding RevShare and MADA." Tr. 960:11–961:9 (Kolotouros (Google)) (discussing UPX0320)); UPX0320 at -605, -617, -681, -702 (red slides instructing to copy attorneys on "any written communication regarding RevShare and MADA"); UPX0697 at -664–66 (same). Google does not, however, require employees to include attorneys for in-person meetings or oral conversations regarding Revshare and MADA. Tr. 961:10–19 (Kolotouros (Google)) (discussing UPX0320); UPX0320 at -605, -617, -681, -702.

1223. Google employees follow their training and include attorneys on "any written communication regarding revshare and MADA," even when not requesting legal advice. Tr. 956:24–957:8, 957:23–958:3, 958:9–11, 958:16–959:6, 961:10–19, 963:8–19 (Kolotouros (Google)) (copied attorneys on all written communications regarding revshare, MADA, and contractual terms; as a "loyal" Google employee, he worked "to protect" the company in litigation); Tr. 9568:11–20 (Rosenberg (Google)) (discussing UPX0706); UPX0706 at -232 ("Make sure to ma[rk] each slide [in "MADA/RSA deck"] as Privileged and have Kate on the

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distribution for her review"); Tr. 2866:9–2867:1 (Kartasheva (Google)) (discussing UPX0150) (marking email attorney client privileged because it "discuss[ed] a revenue share proposal"); UPX0150 at -900 (email estimating the Android search traffic protected by MADA and RSA); Tr. 4937:10–4938:14 (Braddi (Google)) (discussing UPX1110 and admitting that the question she asked counsel in an email was to "mark the document" as privileged, with document not reflecting a request for legal advice); UPX1110 at -191 (requesting that a slide deck analyzing Google's contribution to Apple's profits be marked privileged); Tr. 18:25–19:13 (Sept. 19, 2023 sealed PM session) (Yoo (Google)) (discussing UPX1107); UPX1107 (including attorney on raw data estimating revenues by search access point, with no specific request for legal advice); UPX0713 at -366 (copying attorneys because a potential issue "will impact the messages Samsung conveys to the DOJ [about] the impact of MADA on their devices, business, and users"); UPX0167 at -410 (adding attorney when discussing Samsung MADA, but not requesting legal advice); UPX1108 at -811 (same, when discussing Samsung RSA); UPX0168 at -883 (same, when discussing Samsung MADA and RSA); UPX0660 at -369 (same, when discussing revenue through Samsung access points "we get via MADA"); UPX0316 at -906 (same when discussing MADA, Google Play, and widget placement); UPX0463 (same, when discussing "objectives for Search-related efforts"); UPX0168 at -883 (same, when discussing MADA and RSA).

1224. Google's attempts to shield discovery include the company's CEO. Mr. Pichai testified that he sometimes copied Chief Legal Officer Kent Walker on emails and asked for legal advice when he was not "really seeking legal advice, but [] seeking confidentiality for the document." Tr. 7728:1–12 (Pichai (Google)); *id.*7726:3–16 ("There have been occasions where

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I've just marked [emails] privileged to indicate it's confidential."); UPX0705 at -810 (heavily redacted email chain about Apple ISA on which Mr. Walker is copied but never responds).

2. Google Trains Its Employees To Avoid Topics And Words Relevant To Antitrust Law, And Google Employees Follow That Training

1225. Google has cautioned its employees since at least 2003 to be careful about what they put in writing because it might be discoverable, and employees heed that caution. Tr. 147:12–149:9 (Varian (Google)) (discussing UPX0151); UPX0151 at -162 (Dr. Varian's 2003 memorandum, "[W]e also have to be sensitive about antitrust considerations. Look at it this way: we are currently a dominant player in an industry and we are trying to discourage entry by a potential competitor. . . . We should be careful about what we say in both public and private. 'Cutting off the air supply,' and similar phrases should be avoided."); UPX1101 at -619 ("Google continues to be in the midst of several legal and regulatory matters, including government review of our deal with Yahoo . . . anything you write can become subject to review in legal discovery, misconstrued, or taken out of context, and may be used against you or us in ways you wouldn't expect."); UPX1041 at -426 ("Send me in a privileged email what you think we should do pls"); UPX1097 at -518 ("we should chat live so you can get the history; best to not put in email"); UPX0712 at -514 ("can you pl make the current plan doc also privileged, so we can comment on it?"); UPX0696 at -422 ("[W]e wish NO slides on the terms [of the Apple ISA] as this is all then discoverable. . . contract info on slides is a very bad idea."); UPX0701 at -374 ("Can we put together a list of words that have specific legal ramifications and create a pop-up before an email is sent saying something like . . . Are you sure you don't want to change your wording or CC a lawyer before you send this?").

1226. Google trains its employees to avoid using certain words and phrases, both in public and in private. Employees are trained to not just avoid written communications using

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those words and phrases, but to not even discuss certain topics, such as scale. Tr. 147:12–149:9 (Varian (Google)) (discussing UPX0151 at -162); UPX0151 at -162 ("We should be careful about what we say in both public and private. 'Cutting off their air supply' and similar phrases should be avoided."); Tr. 1796:17–1799:16 (Lehman (Google)) (discussing UPX0204) ("everybody knows Google uses clicks in ranking. . . . They say why are you trying to obscure this issue when it's totally not obscure, everyone knows it."); UPX0204 at -208 ("Do not discuss the use of clicks in search . . . Google has a public position. It is debatable."); UPX1066 at -880 (training to "avoid writing references to 'markets,' 'market shares,' or 'dominance'"; "avoid discussions of 'scale' and 'network effects'"); UPX2091 at -584 ("We are not out to 'crush,' 'kill,' 'hurt,' 'block' or do anything else that might be perceived as evil or unfair."); UPX0701 at -374 ("I just went through Communicating with Care training, and there are a lot of words I've written in emails without thinking much about it (like 'leverage' and 'market share')."); UPX0703 at -465 ("Please avoid using anticompetitive language in your OKRs. We are currently under a DOJ inquiry on antitrust around our Yahoo deal . . . avoid: market or market share dominance, market power . . . leverage" and "consider substituting . . . Most popular, most used"); UPX0277 at -556–57 ("Be careful in discussing search . . . Emails you send to people in Search are likely to be retained indefinitely in connection with multiple, ongoing lawsuits."); *id.* at -559–60 ("Be careful in discussing search . . . We never know when the next regulatory action or subpoena will hit"); *id.* at -564 ("Sensitive topics, [stuff I won't even list here], Do not discuss the use of clicks in search . . . . Google has a public position. It is debatable. But please don't craft your own."). For years, Google's executives have also used the term "search share" or "query share" rather than "market share" to describe the monthly measure of Google's share of the search market; Google executives took this approach because of concerns about antitrust

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liability. Tr. 216:3–7 (Varian (Google)); UPX0499 at -297 ("let's make sure that we are consistent in calling this 'query share' rather than 'market share'"); UPX0702 at -052 ("Don't say 'market share', since that pre-supposes that the 'market' is search-engine advertising, which is bad from an antitrust point of view. It should be OK to say 'estimated share of US queries' or something like that"); UPX0699 at -802 (reminding others to avoid the use of "any antitrust terms—such as 'market' and 'market share' or 'leverage'"); UPX0929 at -480 ("Be very careful in your use of language . . . . Market is an unhelpful word from an antitrust perspective").

1227. Google employees caution one another regarding the use of certain "trigger" words, or copy an attorney when certain words are used. Tr. 211:23–212:12 (Varian (Google)) (referring to UPX0499); Tr. 9575:14–9581:23 (Rosenberg (Google)) (discussing UPX0997 at -065 and UPX2091 at -584); UPX0151 at -162; UPX0499 at -297 (Dr. Varian cautioning to use "'query share' rather than 'market share'"; Ms. Chu responding "absolutely, I'm aware of not using the word 'market', and always use the words PV or search share in all the bi-weekly updates I send to Marissa [Mayer]– the one big thing I remember from all that Legal training. [smiley face]"); UPX0997 at -065 ("(Adding Tristan for legal advice, since I'm about to use some trigger words) Sadly, I think this is all about leverage and money."); UPX2091 at -584 ("we don't 'leverage' markets, products, or resources. Using the word 'leverage' . . . implies exploitation and an absence of consumer choice . . . ."); UPX0699 at -802 (responding to chain about "market share," discussing "antitrust terms" to avoid and the "Five Rules of Thumb" for written communications, and writing "moral is, don't use the term 'm.... s....'. [smiley face]"); UPX0702 at -052 ("Don't say 'market share', since that pre-supposes that the 'market' is search-engine advertising, which is bad from an antitrust point of view.").

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3. Google's Attempts To Shield Documents From Review Are Part Of Its Communicate With Care Program

1228. Google's attempts to shield communications by always copying attorneys on emails regarding MADA and RSA, and avoiding the use of certain antitrust-adjacent words, are part of its "Communicate with Care" training. Tr. 961:20–24 (Kolotouros (Google)) (Google's Communicate with Care training is "offered to Google employees generally"); Tr. 149:8–9 (Varian (Google)) (agreeing he warned people at Google to communicate carefully); UPX0701 at -374 ("I just went through Communicating with Care training, and there are a lot of words I've written in emails without thinking much about it (like 'leverage' and 'market share')."); UPX1099 at -146 (advising Samsung employees in a Google Chat that history was now "on" and to "Communicate with Care given this"); Memorandum in Support of Plaintiffs' Motion to Sanction Google and Compel Disclosure of Documents Unjustifiably Claimed by Google as Attorney-Client Privileged, ECF No. 317–1 at 3–16 (explaining Communicate with Care); Memorandum in Support of the United States' Motion for Sanctions Against Google, LLC and an Evidentiary Hearing to Determine the Appropriate Relief, ECF No. 495–1, Ex. 1 at -251–304 (exhibit PX-120 from *Epic* evidentiary hearing) (example of "Communicate with Care" training).

1229. Eighty-five of the documents admitted into evidence during trial were initially marked as "privileged" and later deprivileged. Fifty-four of those documents were deprivileged only after the Government filed its first motion for sanctions against Google due to its "Communicate with Care" policy. Tr. 964:12–17 (Kolotouros (Google)) (questioning on UPX0713, used at Mr. Kolotouros's third deposition following deprivileging of documents).[16]

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[16] After multiple rounds of re-review of "silent attorney" emails, Google abandoned privilege on 12% (26 of 210 documents) of the random sample the Court requested for review in chambers, prior to their submission, demonstrating that Google only closely reviewed documents marked as

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X. GOOGLE'S PRO-COMPETITIVE JUSTIFICATIONS LACK FACTUAL SUPPORT AND DO NOT OUTWEIGH HARMS IN RELEVANT MARKETS

1230. Google has identified purported procompetitive benefits that result from its distribution agreements with Apple, Android OEMs, U.S. carriers, and third-party browser companies. Those benefits are largely illusory, as Google has failed to substantiate them beyond conjecture from abstract principles of economics. *Infra* ¶¶ 1231–1248 (§ X.A.1), 1310–1344 (§ X.C). Even if there was evidence of those procompetitive effects, Google has not shown that they justify harms to consumers in the general search services or advertising markets. *Infra* ¶¶ 1297–1309 (§ X.B.2), 1310–1344 (§ X.C).

A. Google Failed To Show Effective "Competition For The Contract"

1. "Competition For The Contract" Would Not Prevent Competitive Harms Even If It Existed

1231. "Competition for the contract," even if it existed, would not cure the anticompetitive harms caused by Google's search distribution deals because (1) dominant firms and distributors can find it worthwhile to enter contracts that harm competition; (2) dominant firms are able to use monopoly profits when bidding for exclusive contracts; and (3) competition for exclusives can make competition less intense where there is a dominant firm. UPXD106 at 25; Tr. 10513:21–10527:11 (Whinston (Pls. Expert)); Tr. 9768:23–9774:3 (Murphy (Def. Expert)) (describing Google's competition for the contract argument); *id.* 10112:7–16 (agreeing that the existence of multiple bidders for a contract does not always create competition that resolves exclusionary concerns).

"privileged" when it was clear it would be held accountable. May 12, 2022, Status Conference Tr., ECF No. 353, at 60:16–67:21.

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a) Dominant Firms And Distributors Do Not Always Act In Search Consumers' Best Interests

1232. Individual market participants benefit from competition but can make short-term decisions that can harm competition in the long term. Tr. 10513:21–10516:1 (Whinston (Pls. Expert)) (explaining how competition is a public good).

1233. Search distributors, such as OEMs and carriers, benefit from competition in the market for general search services because search providers competing to distribute their products will bid up prices or offer better deal terms, including higher revenue shares. *Infra* ¶¶ 1298–1299.

1234. At the same time, distributors do not always act consistent with the public's interests. Tr. 10516:17–10517:25 (Whinston (Pls. Expert)). Distributors care about their profits and seek to maximize them. To do so, they cater to consumers who use their products and whose business they need to attract and maintain, but not consumers who do not buy or use their products or browsers. *Id*. 10513:21–10516:1. Search distributors' interests are particularly ill-aligned with advertisers; the more advertisers pay for Search Ads and Text Ads, the more money distributors make through their revenue shares. *Id*. 10516:2–25.

1235. Even if a single distributor wanted to try to promote more competition in the marketplace, the relatively small size of most distributors combined with Google's dominant position means that any action it takes would harm the distributor but have a limited effect on competition. Tr. 10518:2–10519:2 (Whinston (Pls. Expert)). As a result, distributors may be incentivized to contract with Google even if the distributor would be better off with more search competition. *Id*.

1236. Unlike consumers, dominant firms, such as Google, benefit from less competition. Instead, they benefit from less competition because it allows them to charge higher prices and

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earn monopoly profits. Tr. 10513:21–10516:1 (Whinston (Pls. Expert)) (describing dominant firms' attitudes toward competition); *id.* 10519:15–10521:22 (before the introduction of meaningful competition, monopolists enjoy monopoly profits).

1237. Because neither search distributors nor dominant firms, like Google, account for preserving competition across the general search services market, there is room for a mutually beneficial distribution deal that harms competition. Tr. 10519:15–10521:22, 10517:2–25 (Whinston (Pls. Expert)). Put differently, a dominant firm who benefits from reduced competition will find it worthwhile to pay a distributor to agree to terms that reduce competition. *Id.* 10517:2–25.

1238. Apple is illustrative. It is a profit maximizing firm, and its interests are not always aligned with those of its users (and certainly are not always aligned with the interests of rival-smartphone users). Tr. 10035:24–10036:8 (Murphy (Def. Expert)). In making decisions about search, Apple seeks to satisfy its customers while maximizing the money it receives under its ISA. Tr. 2463:15–18, 2464:8–2465:7 (Cue (Apple)) (In negotiating the ISA with Google, under which Google paid Apple $20 billion in 2022, the "economics was an important part."); Tr. 10658:24–10559:7 (Whinston (Pls. Expert)) (Distributors such as Apple have different and sometimes divergent interests from consumers.); *Infra* ¶¶ 1298–1299.

1239. Apple has repeatedly taken actions that were in its own interest, but not its customers'. For instance, in 2013, Apple—an e-Book distributor—was found liable for violating the antitrust laws for conspiring with book publishers to change the pricing model for e-books, resulting in a retail price increase for Apple customers, among others. Tr. 10037:4–15 (Murphy (Def. Expert)) ("[P]resumably Apple's customers would prefer lower prices" on e-books.).

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1240. Even a public-interest minded distributor may take actions that harm competition. Mozilla is a nonprofit dedicated to maintaining the internet as an open and accessible public resource by advocating for user choice, privacy, security, open source, and interoperability. Des. Tr. 20:16–21:14 (Baker (Mozilla) Dep.). One reason Mozilla chose to set Yahoo as the default for Firefox in 2014 was to promote competition, reasoning that building up a Google competitor would be in Mozilla's and other distributors' shared interest. UPX0315 at .005 ("Does not promote competition for search" and "Supports the continued dominance of Google" were reasons to discontinue Google search distribution partnership); UPX0107 at -358 (Mozilla backers of decision to move default to Yahoo "excited about the disruptive opportunity"); UPX1070 at -313 ("In the right setting, Mozilla can have a significant impact on the direction of innovation"). But Mozilla represents a small share of the total search market, and its search traffic alone cannot guarantee there are strong competitors in the market. Tr. 10518:2–10519:2 (Whinston (Pls. Expert)).

1241. As the largest recipient of Google's revenue share payments, Apple has more of an incentive to promote competition than smaller distributors and, with the significant share of searches being conducted on its devices, a greater ability to affect competition. Tr. 10519:3–12 (Whinston (Pls. Expert)). However, even Apple only represents half the smartphone market and cannot guarantee robust competition; Apple is still affected by choices made by firms in the market. *Id.*

b) Google Can Use Monopoly Profits To Outbid Rivals

1242. "Competition for the contract" would also not be expected to meaningfully check Google's monopoly power because competition for exclusive contracts favors dominant firms. Tr. 10519:15–10521:22 (Whinston (Pls. Expert). In a competitive marketplace, a dominant

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firm's profits will fall to a competitive level because competition tends to drive down profits for all firms in a market as they compete for business on price and quality. *Id*.

1243. Prior to the introduction of meaningful competition, a dominant firm enjoys monopoly profits due to its ability to charge above-market rate prices. Its rivals do not. Tr. 10519:15–10521:22 (Whinston (Pls. Expert)). Google, as a dominant firm, has a structural incentive then to use its monopoly profits—which competitors do not earn—to prevent the emergence of competitive conditions. Google, so long as it remains dominant, will always outbid its rivals (who are bidding to win competitive profits) for exclusive contracts to maintain Google's share position. *Id.*

1244. Google's search rivals recognize this dynamic. As Mr. Nadella observed, "[r]ight now there is basically [a] status quo," with Google, "the dominant player in search . . . paying a lot of money to maintain [its] share position." Tr. 3503:22–3504:17 (Nadella (Microsoft)).

c) Competition For Exclusives Can Make Competition Less Intense

1245. Finally, winner-take-all competition is weak in industries dominated by a single firm because that firm will always win. Tr. 10522:2–10526:1 (Whinston (Pls. Expert)). Given Google's insistence on only paying for default exclusivity, competition for distribution is currently an all-or-nothing contest. UPX0072 at -216. Google's distribution contracts ensure there is one winner and that winner serves as the search provider on every search access point on a device or browser. For a dominant firm to beat a rival, it only needs to be better on average than a rival for all different uses and consumers across every search access point. Tr. 10522:2–10526:1 (Whinston (Pls. Expert)).

1246. The all-or-nothing contest softens smaller and specialized rivals' incentive to compete across the board by preventing them from just competing for those queries in which they are most competitive. Tr. 10522:2–10526:1 (Whinston (Pls. Expert)).

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1247. For example, a privacy-focused search engine like DuckDuckGo has little chance of outbidding Google to be the sole exclusive default on Apple devices because DuckDuckGo is ill-equipped to compete against Google for every query. Tr. 10522:2–10526:1 (Whinston (Pls. Expert)). DuckDuckGo is far more competitive against Google when competing just for users searching in private browsing mode. If DuckDuckGo were able to compete to be the default only for those searches, it would have a greater chance of success because it would not be forced to compete for queries that are outside its specialty. *Id.* Competition could then be further enhanced as DuckDuckGo took advantage of scale economies to improve its product and broader competitiveness against Google. *Id.*; Tr. 9716:5–9718:12 (Murphy (Def. Expert)) ("I don't see DuckDuckGo as a default competitive competitor because they're more of a niche player.").

1248. Many if not most of Google's other search rivals also would compete more effectively for incremental searches if given the chance. Tr. 10522:2–10526:1 (Whinston (Pls. Expert). For example, Microsoft is better positioned to compete for distribution in the United States than in other countries. It is also better positioned to compete for distribution on desktop computers than on mobile devices. UPX0260 at -681 (Apple study finding that, for desktop queries in the U.S., Bing ties Google in result relevance and outperforms Google in overall user preference). But because Google insists on being set as the exclusive default on all devices in nearly all countries, Microsoft cannot reach a targeted deal. Tr. 3137:21–3139:2 (Tinter (Microsoft)) (Based on Microsoft's modeling, "[t]he optimal thing for Apple to have done" would have been to switch to Bing in the United States and stay with Google for the rest of the world, but "because of . . . their relationship dynamics with Google, they couldn't do that."). Therefore, the only option available to Microsoft is to attempt to outbid Google for a global, exclusive deal, which it has been unable to do. *Infra* ¶¶ 1263–1278 (discussing Microsoft's

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inability to defeat Google for an all-or-nothing deal for the Safari default); Tr. 2478:24–2479:3 (Cue (Apple)) (ISA terms apply to all Apple devices with a browser, so Apple cannot choose different search providers for iPhones and Mac computers); *id*. 2478:2–8 (ISA does not have a carveout for the United States, so Apple cannot choose different search providers for the United States and international markets).

2. There Has Been No Meaningful "Competition For The Contract" For Over A Decade

1249. There is no evidence of meaningful competition in the general search services market. To the contrary, the record indicates that only minimal competition has existed over a decade. Tr. 1603:9–14 (Roszak (Google)) (recalling no other time in his tenure, besides the Mozilla Firefox episode in 2014, when Google lost a bid for a search default in the United States).

1250. Given the lack of strong GSE rivals for Google, minimal competition exists for default agreements in the United States today. Tr. 2464:8–2465:7 (Cue (Apple)) (there was no valid alternative general search provider to Google when Apple was negotiating ISA renewal in 2016)); Tr. 7772:12–7773:10 (Pichai (Google)) (Google was aware it was the only viable option for Apple and leveraged this fact in 2016 negotiations); Tr. 3503:22–3504:17 (Nadella (Microsoft)) ("Right now, there is basically status quo, right; the dominant player in search is paying a lot of money to maintain that share position."); Tr. 10519:15–10521:22 (Whinston (Pls. Expert)) (competition for the exclusive contracts favors the monopolist).

1251. Rival distributors face significant disadvantages relative to Google with respect to their quality and ability to monetize search queries. *Supra* ¶¶ 559–562. As a result of these disadvantages, those rivals cannot win default distribution deals even when they offer distributors 100% or more of the revenue they earn on devices. Tr. 3503:22–3504:17 (Nadella

[redacted]

(Microsoft)) (Microsoft prepared to incur billions of dollars in losses to secure the search default deal with Apple); Tr. 3137:8–3137:20 (Tinter (Microsoft)) (Microsoft willing to make a "multi-billion-dollar negative investment" to secure the Apple default); UPX0105 at -710.002 (Bing offered [redacted]% profit share in bid for Mozilla Firefox default, compared to Google's offer of [redacted]% to [redacted]%.).

1252. Distributors do not view DuckDuckGo or other small GSEs as viable alternatives to Google when negotiating an all-or-nothing deal. Tr. 2540:9–14 (Cue (Apple)) (Bing and DuckDuckGo were not viable options for Apple, and Apple did not consider any other alternatives.); Des. Tr. 263:11–264:6 (Giard (T-Mobile) Dep.) (T-Mobile dismissed DuckDuckGo early on a possible default search provider for T-Mobile's Android devices.); Des. Tr. 240:15–241:4 (Ezell (AT&T) Dep.) (in considering Google RSA renewals, AT&T considered Bing "really the only company that fit [the] criteria" for a "a general web Internet search capability comparable to Google").

1253. Google typically does not consider actual or potential bids from rival GSEs when determining how much it is willing to pay its distribution partners in exchange for defaults. UPX6024 at -443 (written 30(b)(6) response: "Google typically has not used the amount of an actual or estimated competing bid in determining how much it was willing to pay for its revenue share agreements with Apple, Mozilla, Samsung, AT&T, Verizon, T-Mobile, and Sprint.").

1254. On Android, no rival search engine has won a "competition" against Google to be set as default in the United States in over a decade. Tr. 3114:10–13 (Tinter (Microsoft)) (in the last decade, Microsoft has not gained any distribution on Android devices); *id*. 3237:8–3238:17 (Samsung not willing to enter into a partnership with Microsoft for the "big entry points," such as "the browser, the widget, the preinstalled search app," because "they were managing the

[redacted]

Google relationship"); Tr. 1087:16–20 (Higgins (Verizon)) (Verizon did not preload any rival search engines on Android devices); Tr. 3691:18–3692:12 (Ramaswamy (Neeva)) ("very, very hard" for Android distributors to "really offer Neeva even as an option—not the default search, but as a default search option on their phones").

1255. In fact, when their default distribution contracts with Google are up for renewal, Android OEMs and carriers do not even seek bids from rival search engines or negotiate with anyone other than Google. Tr. 1117:6–14 (Higgins) (Verizon)) (Verizon did not solicit bids from Microsoft or DuckDuckGo when negotiating its renewal with Google); Des. Tr. 237:20–238:8 (Ezell (AT&T) Dep.) (AT&T did not solicit bids or initiate discussions with Microsoft in connection with the Google negotiations.); Des. Tr. 201:17–20 (Baxter (Samsung) Dep.) (no recollection of Samsung ever receiving meaningful proposal from Microsoft to preload Bing on any Samsung Android mobile phones in the U.S.); Tr. 10155:21–25 (Murphy (Def. Expert)) (no evidence that Android OEMs put their search defaults out for bids when their contracts come up); *id*. 10156:15–19 (no evidence that Android OEMs negotiate search defaults with any party other than Google); *id*. 10157:25–10158:6 (no evidence that Google's default agreements with Android OEMs are intensely competed over).

1256. Even if there was evidence of meaningful competition for search defaults, there are less restrictive alternatives than using exclusive defaults to promote competition, including competing directly for users through product quality or other incentives. Tr. 6462:2–15, 6462:23–6464:1 (Nayak (Google)) (Google implemented a project to decrease latency in 2017 in response to tests showing Bing returns results faster than Google); Tr. 8269:5–8272:7 (Reid (Google)) (Google rushed to launch AI products in response to Bing Chat).

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a) Yahoo's Bid To Be The Firefox Default

1257. The most recent example of a rival successfully outbidding Google for default distribution on a browser or smartphone in the United States came in 2014, when Mozilla changed the Firefox default to Yahoo. But that episode illustrates why rivals have not wrested a single default away from Google since. *Supra* ¶¶ 1063–1065.

1258. In 2014, Mozilla changed the default GSE in Firefox from Google to Yahoo. Des. Tr. 69:22–70:3 (Baker (Mozilla)) Dep.). Mozilla was motivated by its recognition that relying on Google "[d]oes not promote competition in search," "supports the continued dominance of Google," and fosters Mozilla's "dependency on Google." UPX0315 at .005; Des. Tr. 271:8–11, 271:14–272:2 (Baker (Mozilla)) Dep.) ("Competition in [the] search market would help us. . . . There aren't many alternatives."). Mozilla believed that reaching a deal with Yahoo would give Mozilla "independence from Google" and could be an "[o]pportunity to level the playing field in search." UPX0315 at .006.

1259. To win the Firefox search default in 2014, Yahoo substantially outbid both Google and Bing (despite Bing offering a 100% revenue share). Des. Tr. 200:14–22 (Baker (Mozilla) Dep.) (Before the 2014 default switch to Yahoo, Google was paying Mozilla roughly $275 million a year, on a flat-fee basis, for the Firefox default.); UPX0107 at -092 (Yahoo offered $375 million-a-year guarantee, versus Google's [redacted]% revenue share offer valued at $[redacted] million.); UPX0105 at .007 (Bing's [redacted]% revenue share offer valued at $[redacted] million in first year, falling below $[redacted] million in subsequent years.).

1260. Prior to installing Yahoo as its default search engine in late 2014, Firefox's market share—which comes almost entirely from desktop computers—had been declining sharply for several years. Tr. 10073:4–10074:14 (Murphy (Def. Expert)) (There was no detectable increase in the pace of Firefox losses when the default switched to Yahoo.); UPX0851

[redacted]

at -401 (showing Firefox's declining market share from 2010 to 2014); *id.* at -402 (showing Firefox's de minimus market share on mobile phones).

1261. After winning the Firefox default, Yahoo responded to the resulting financial pressure by loading the search page with ads, which degraded the user experience. Des. Tr. 236:24–237:13 (Baker (Mozilla) Dep.) (after becoming the Firefox default, Yahoo began to insert too many ads on the search page, resulting in a bad user experience); *id*. 237:18–24, 239:2–12 (discussing UPX0898 and Mozilla's concern that Yahoo was under pressure to increase short-term revenues by increasing ads to the SERP); UPX0898 at -467 ("The Yahoo team has been under continual pressure to increase monetization of the SERP" and describing various increases in ad density on the Yahoo search page). By 2017, Yahoo no longer represented a viable option for Mozilla, and Mozilla returned to Google. Des. Tr. 79:2–14, 271:18–272:2 (Baker (Mozilla)) Dep.).

1262. Since 2014, no rival search engine has won default distribution on any browser or smartphone in the United States in a "competition for the contract" against Google. Tr. 1603:9–14 (Roszak (Google)) (recalling no other time in his tenure, besides the Mozilla Firefox episode in 2014, when Google lost a bid for a search default in the United States).

b) Microsoft's Failed Efforts To Compete For The Safari Default

1263. Microsoft's inability to compete against Google for the Safari default illustrates the lack of meaningful competition that exists for search distribution agreements.

1264. In 2015, Microsoft approached Apple about the possibility of a search partnership. Tr. 2508:7–12 (Cue (Apple)). Microsoft informed Apple that Microsoft was "willing to provide Apple with the majority of profits" and "willing to provide Apple with the tools to enable a more private search experience that is consistent with the broader Apple value

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proposition." UPX0614 at -112; UPX0613 at -110 (Cook (Apple) circulating Microsoft's proposal within Apple); *supra* ¶¶ 1063–1065 (discussing Microsoft's message to Apple on the scale benefits of a deal). Microsoft initially offered to pay Apple 90% revenue share in exchange for setting Bing as the default GSE on Safari. UPX0614 at -113–14. Microsoft estimated that its revenue share payments would total approximately $[redacted] billion over the next five years. UPX0614 at -114.

1265. After receiving Microsoft's proposal, Apple analyzed the financial and quality aspects of how a deal with Microsoft would compare to Apple's existing deal with Google. Tr. 2514:6–25 (Cue (Apple)) (Apple "did a lot of analysis."). Microsoft faced a major disadvantage in its ability to monetize because Microsoft lacks scale, particularly on mobile, and because Google can generate monopoly profits. *Supra* ¶¶ 984–1014 (§ VIII.A.2), 1231–1240 (§ X.A.1.a). Apple expected to receive approximately $[redacted] billion in payments from Google under the ISA over the next five years and $[redacted] billion over the following five years. UPX0273 at -974. Apple found that, "[c]learly, Microsoft can't commit to these numbers or even anything close to them." *Id.*

1266. Google's own findings confirmed Apple's analysis; Google found that Microsoft would need to offer Apple a 122% revenue share rate just to match Google's payments at a 33.75% revenue share. UPX0674 at -914; Tr. 1684:17–23, 1685:7–1687:7 (Roszak (Google)). Google named this project "Alice in Wonderland"—in which "Alice" was the codeword for Microsoft—after a dream sequence. *Id.* 1678:5–20, 1690:5–9. As Microsoft got "desperate," it offered Apple a 100% revenue share rate. Tr. 2511:12–21 (Cue (Apple)). But even at a 100% revenue share rate, Microsoft "couldn't come close" to Google's expected payments to Apple. *Id.* 2512:6–19.

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1267. Mr. Cook asked Apple's leadership team whether they believed there was "a guarantee level that would protect us and make it impossible for [Microsoft] to walk [away] while not being reckless [for] them to agree." UPX0273 at -975.

1268. Apple ultimately asked Microsoft for a guarantee totaling $[redacted] billion over the next five years, which would exceed even the $[redacted] billion that Apple projected to receive from Google. UPX0536 at -907–08 (Cook (Apple) told Nadella that "[Apple] needed a guarantee for the first five years with the numbers mentioned below."). Apple knew there was "no way they [were] going to do it." Tr. 2522:3–2523:23 (Cue (Apple)); Des. Tr. 74:9–75:5 (Apple-EC 30(b)(6) Dep.) (Apple requested the guarantee "just to kind of end the discussions and quit wasting time.").

1269. Microsoft calculated that agreeing to Apple's requested guarantee would require Microsoft to incur multiple billion dollars in losses. Tr. 3135:21–3137:20 (Tinter (Microsoft)) ("we could not meet the number," and "mak[ing] Apple whole . . . would have represented a multi-billion-dollar investment on Microsoft's part"); *id.* ("In the short term, it would have been highly negative."); *id*. 3269:17–32:72:10 (explaining UPX0115 at -139 and that Apple's request would have required Microsoft to incur between $[redacted] million and $[redacted] billion in losses in the first year of the deal).

1270. Microsoft was open to incurring losses of this size to achieve the long-term scale benefits of a deal. *Id*. 3135:21–3137:20 ("[W]e looked at the gap -- the gap relative to the numbers, we said, [t]hat is an investment that is worth making."); Tr. 3503:22–3504:17 (Nadella (Microsoft)) (Microsoft prepared to incur billions of dollars in losses to gain scale and become more competitive).

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1271. However, to reduce the risk that it would incur even greater losses due to lower-than-expected query volumes, Microsoft requested that Apple commit to sending Microsoft a particular volume of traffic. UPX0628 at -943 (Mr. Nadella (Microsoft) wrote to Mr. Cook (Apple): "As we discussed, the numbers are well above both the internal Microsoft and third party estimates . . . . I think it makes sense to move back to a structure where Apple guarantees the volume of searches and Microsoft guarantees the revenue per search."). Apple was unwilling to make this commitment, meaning that Microsoft would be on the hook for even more than the billions in losses that it was already projecting. UPX0628 at -942 (Mr. Cook (Apple) to Mr. Nadella (Microsoft): "We are concerned about the proposed structure of the deal."); Tr. 2518:25–2519:11 (Cue (Apple)) (Microsoft would owe Apple the guaranteed amount regardless of the revenue that Microsoft generated from searches on Apple devices).

1272. Microsoft also faced a major disadvantage relative to Google with respect to quality. *Supra* ¶ 560. After conducting its quality assessment, Apple found that "it was clear to us that there's no way they were an alternative or a choice that we could make for our customers." *Id.* 2512:20–2513:20. Apple concluded that there was [redacted]. *Id.* 2530:14–2531:13. Ultimately, given Microsoft's monetization and quality disadvantages, Microsoft was "never close to a deal." *Id.* 2522:3–2523:23. Apple decided instead that it was a "no brainer to stay with Google as it is as close to a sure thing as can be." UPX0273 at -974.

1273. In 2018, Microsoft reinitiated discussions with Apple about a potential search partnership. Tr. 2580:9–17 (Cue (Apple)).

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1274. Microsoft put "everything [] on the table" with respect to possible deal structures, including (1) "a pure commercial deal" for Microsoft to "power [an] Apple Search experience," (2) "put[ting] the search business into a joint venture," or (3) "sell[ing] Bing to Apple" entirely. Tr. 3275:5–3276:15 (Tinter (Microsoft)); Tr. 3658:19–3659:11 (Nadella (Microsoft)) ("We had all kinds of strategic flexibility. . . . We were going to take whatever Apple felt was their chance as a success with the technology."). Microsoft was willing to "put everything on the table" because, given the importance of scale in mobile and Google's control over the Android platform, an Apple deal was "really the kind of [] most compelling idea that we had." Tr. 3276:16–3277:23 (Tinter (Microsoft)).

1275. But Microsoft's flexibility was not enough to overcome its disadvantages. Although Microsoft believed it may be able to beat Google's payments in the United States, it could not do so in other countries given Google's monetization advantage; Google's "all-or-nothing" deal with Apple made a U.S.-only deal impossible. Tr. 3135:22–3139:2 (Tinter (Microsoft)); UPX0736 at -416 ("We talked about the single country idea. He [Apple VP of corporate development Adrian Perica] said this won't work for them [Apple]. They don't know how to make [it] work with [the Google] agreement.").

1276. In addition, because Bing lacks scale in mobile and international queries, Bing possessed "acknowledged product gaps" in these areas. Tr. 3252:13–3255:3 (Tinter (Microsoft)) ("A major contributor to the quality gap was the lack of scale."). These gaps concerned Apple. UPX0240 at -507 ("Not having mobile queries at scale is a huge liability for them since the most important search signal is engagement."); UPX1125 at -286 (Mr. Giannandrea wrote: "While we could do something in the US, I[']d worry about international quality."); UPX0754 at -298 ("The unknown about Bing from our consumer experience is [internationalization] quality and we will

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hopefull[y] have more data soon. The bar is high, we know that when we use [G]oogle we get world class resu[l]ts and revenue.”).

1277. Bing attempted to convince Apple that access to Apple’s query scale would enable Microsoft to make sufficient investments to improve its quality in these areas. Tr. 3252:13–3256:16 (Tinter (Microsoft)); UPX0797 (“playbook” describing investments Microsoft could make to take advantage of Apple’s scale and improve international quality). These attempts proved unsuccessful, and Apple determined that “[redacted].” DX0376 at -201.

1278. Ultimately, Apple viewed Microsoft’s efforts as a “desperate move to get rid of” Bing. Tr. 2581:20–2582:6 (Cue (Apple)). Mr. Cook decided that Apple “[redacted].” DX0376 at -201.

B. Purported Pass-Through Benefits Are Unsubstantiated And Do Not Justify Competitive Harms To Consumers In Relevant Markets

1279. Google’s payments are not passed through to consumers, and even if they were, the payments do not outweigh harm to competition in the relevant markets. Tr. 10527:12–19; 10535:21–10538:4 (Whinston (Pls. Expert)).

1. Google Did Not Demonstrate That Its Search Payments Are Passed Through To Consumers In The Form Of Lower Retail Phones Or Improved Services

1280. Google has not shown that its revenue share payments to distribution partners are passed through to consumers, whether in the form of lower device prices or improved products and services.

a) Google Has Not Shown That Payments To Apple And Android Partners Are Passed Through To Consumers

1281. Google has not established that its revenue share payments to Apple, Android OEMs, and U.S. carriers are passed through to consumers as lower retail prices for smartphones.

[redacted]

1282. The ISA and RSAs do not constrain how Google's distribution partners use their revenue share payments, let alone require them to pass all or a portion of those payments through to consumers in the form of lower smartphones prices. Tr. 4944:2–4 (Braddi (Google)) (Google does "absolutely not" impose any conditions on Apple with regard to how Apple spends its revenue-share payments from Google.); Tr. 2466:11–17 (Cue (Apple)) ("[T]he money is just Apple's to decide how to use it."); Tr. 9565:20–9566:15 (Rosenberg (Google)) (Google does not require Android distribution partners' to use revenue-share payments to lower phone or wireless prices.); Des. Tr. 207:8–13 (Giard (T-Mobile) Dep.) (Google's 2021 RSA with T-Mobile does not limit how T-Mobile uses the money); *e.g.*, JX0033 at -797–99 (§ 4) (Apple ISA (2016 amend.)) (providing payment terms without limits on how payments are used); JX0071 at -401 (§ 4.1) (Samsung RSA (2020)) (same); JX0091 at -751 (§ 4.1) (AT&T RSA (2021)) (same); JX0093 at -498 (§ 4.1) (Verizon RSA (2021)) (same); JX0095 at -696 (§ 4.1) (T-Mobile RSA (2021)) (same).

1283. Google's distribution partners do not earmark revenue-share payments for any particular use. Apple, for instance, does not designate the money it earns through the ISA for use in lowering retail device prices or improving services, including its preinstalled browser. Tr. 2466:11–17 (Cue (Apple)). T-Mobile similarly does not earmark Google's revenue share and bounty payments for any specific purpose. Des. Tr. 214:18–215:1 (Giard (T-Mobile) Dep.).

1284. No OEM or carrier executive testified at trial or in designated testimony that their company takes revenue-share payments into account when setting device prices. To the contrary, each testified either that there is no direct connection between Google's RSA payments and the retail price of phones, or that they are not aware of any connection. Des. Tr. 215:19–216:6 (Giard (T-Mobile) Dep.) (revenue-share payments do not directly factor into the retail price of T-Mobile

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phones and, although T-Mobile services and offerings indirectly factor into how T-Mobile prices its devices, RSA payments are not "a driving factor" or "even the largest factor"); Des. Tr. 90:19–91:1 (Christensen (Motorola) Dep.) (disclaiming any knowledge of whether RSA payments directly lower smartphone costs).

1285. Similarly, no Google employee who testified at trial or in a designated deposition had actual or personal knowledge about specific distribution partners using revenue-share payments to lower device prices. Google employees disclaimed knowledge of any internal analyses regarding distribution partners' use of revenue-share payments to lower retail prices, and Google's economist testified that he did not model the issue or quantify the degree of pass-through. Tr. 9565:1–9566:13 (Rosenberg (Google)) (disclaiming awareness of any Google analysis into Android partners' use of revenue-share payments to lower phone or wireless plan prices); Tr. 10162:4–7 (Murphy (Def. Expert)) (Google makes no effort to track how Android partners use revenue-share payments.); *id*. 10162:8–13 (not aware of testimony showing a direct connection between revenue share payments and Android phone prices).

1286. Google's ordinary-course documents do not show that revenue-share payments are passed through to consumers. Notably, when analyzing potential search distribution agreements, Google does not consider how its revenue-share payments will affect smartphone prices. Tr. 10183:13–18 (Murphy (Def. Expert)) (discussing UPX1128 and agreeing that supporting lower-priced Android phones was not cited as a rationale for Android RSAs); UPX1128 at -097 (seeking approval from Google CFO for new Android RSAs, with no reference to phone prices as a rationale); UPX0161 at -053 (same); UPX0129 (August 2019 primer on the Android Commercial Agreements makes no mention of lowering retail prices as a purpose or effect of RSAs.). Similarly, when Google considered reducing revenue share

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payments, there was no discussion of how the cuts would affect phone prices. UPX0293 at -425 (seeking approval from BC for Android revenue share deal that cut revenue share for Verizon from [redacted]% to [redacted]%, with no reference to effect on phone prices or output).

1287. Prof. Murphy's claim that revenue-share payments are passed on to consumers in the form of lower retail prices on higher quality devices is based on a flawed reading of the evidence and directly contradicted by trial testimony and exhibits. Tr. 10535:21–10536:15 (Whinston (Pls. Expert)).

1288. Lacking documentary or testimonial evidence to support his claim that revenue share payments are passed on to consumers, Prof. Murphy relies on general economic theory rather than econometric analysis. Tr. 10163:20–21, 10169:11–14 (Murphy (Def. Expert)). The only data analysis Prof. Murphy provided in support of his pass-through theory was a comparison of (1) Apple's reported profit margins for device services, which includes Google's revenue-share payments to Apple under the ISA, to (2) Apple's reported overall profit margins for devices. *Id.* 10168:9–10169:2. Because the rising services profit margin ***coincided*** with a decreasing device profit margin, Prof. Murphy hypothesized that Apple ***may*** be passing Google's search payments through to consumers in the form of lower device prices. *Id.* at Tr. 10169:3–10.

1289. Instead of conducting an econometric analysis, Prof. Murphy relied on general economic theory to prove causality between payments to Apple and iPhone prices going down. Tr. 10169:11–14 (Murphy (Def. Expert)).

1290. As a result, Prof. Murphy's analysis of Apple's relatively constant services margin is unreliable, potentially reflecting a wide range of unrelated factors. Tr. 10535:21–10536:15 (Whinston (Pls.' Expert)) (Prof. Murphy's margin analysis was not reliable). Apple's services margin includes costs and revenues from various products and services besides revenue-

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share payments from the ISA, and trends related to those products and services could explain why Apple's services margin increased while its overall device margin stayed constant. Tr. 9711:5–9712:22 (Murphy (Def. Expert)) ("I want to make clear, I don't want this to be misleading. I'm not just looking at default revenues here in the service margin. Service margin is going up for other reasons. They sell other things other than search."); Tr. 9709:19–9711:4 (Murphy (Def. Expert)) (". . . [S]ervices would be including the default payments, but it also includes other service revenue this firm was getting . . .[.]").

1291. Apple's devices margin could also be affected, at least in part, by sales in recent years of lower-priced and older-model phones. Tr. 10169:19–10170:9 (Murphy (Google's Expert)) (agreeing that Apple's sale of lower-priced and older-model devices could account for at least part of the trend in Apple's services margin data).

1292. Ultimately, as Prof. Murphy concedes, the trends observed in Apple's services margin data could be mere coincidence and thus provide no support for Google's purported justification. Tr. 9709:19–9711:4 (Murphy (Def. Expert)) ("Now, it's also possible that . . . there was no passthrough going on here, it was just a coincidence.").

1293. Moreover, even if there was compelling evidence of the existence of pass-through, Google introduced no evidence that measures—qualitatively or quantitatively—the amount Google's payments have lowered retail device prices and services. Tr. 10163:17–21 (Murphy (Def. Expert)) (aware of no econometric data showing that Google's payments to OEMs and carriers affect the price of Android devices); *id.* 10169:11–14 (confirming he conducted no econometric analysis to link Google's ISA payments to Apple and iPhone prices).

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b) Third-Party Browsers

1294. Google failed to establish that revenue-share payments to third-party browser companies result in more innovation and better products. Google has not identified any specific features or innovation that were introduced as a result of Google's revenue-share payments.

1295. Prof. Murphy's data showing that Google's revenue-share payments comprise a large percentage of Mozilla's total revenue does not establish that those payments have made Mozilla's Firefox browser better or more innovative. Mozilla offers several products besides Firefox, and Mozilla uses its search revenue to finance the development of and updates to those products. Des. Tr. 45:15–17, 45:19–21 (Baker (Mozilla) Dep.) ("Our Search revenue has funded products other than Firefox, yes."); UPX0979 at -407 (discussing Mozilla's VPN and password manager products); UPX2080 at -123 (discussing development of the FirefoxOS).

1296. A portion of Mozilla's revenue is also used for executive compensation. Mozilla's Chairwoman, Mitchell Baker, earned $2.5 million in 2020 and between $3 and $5 million in 2021. Des. Tr. 292:20–293:9 (Baker (Mozilla) Dep.). Her compensation is based in part on Mozilla's revenue. *Id*. 292:13–19.

2. Even If There Was Evidence Of Pass-Through, Lower Retail Prices And Improved Browsers Would Not Justify Harms To Competition

1297. More fundamentally, even if Google had demonstrated pass-through, that purported justification would not undermine Plaintiffs' prima facie case because (1) revenue share payments would be higher in a competitive market; (2) Google has not established benefits in the relevant markets; and (3) there are less restrictive means of lowering device prices and subsidizing browser innovation.

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a) Revenue Share Payments Would Be Higher In A Competitive Market

1298. Even if Google had demonstrated that distribution partners like Apple and Mozilla pass through a portion of Google's revenue-share payments to consumers, payments to distribution partners—and the concomitant effect on device prices and products—would be larger absent the restrictive terms in Google's contracts. Tr. 10527:12–10528:25 (Whinston (Pls. Expert)) (stronger rivals would bring more competitive pressure to the market for default arrangements). Under less-restrictive alternatives to Google's contracts—including ones in which Google's contracts permit rivals to compete for some search access points on devices—rivals in the general search services market would have a better chance to gain traffic and scale and become stronger competitors. Stronger competitors in the market would pressure Google to increase revenue share payments. Tr. 10526:12–10528:25 (Whinston (Pls. Expert)); Des. Tr. 271:8–272:2 (Baker (Mozilla) Dep.) (more competition in the search market would help Mozilla in negotiations for the Firefox default); Tr. 3504:18–3505:23 ((Nadella) (Microsoft)) (Microsoft has not won default placement on Safari, but Apple has used Bing "to bid up" the revenue share it gets from Google).

1299. Real-world evidence confirms that even the limited competition that exists in the marketplace today has increased Google's revenue-share payments to distributors. Apple has benefited from having Bing in the general search services market because, at least in the short term, Microsoft bids up the price that Google pays for Apple's Safari default. Tr. 3504:18–3505:23 ((Nadella (Microsoft)); Tr. 2725:1–20 (Parakhin (Microsoft)) ("They [Apple] use us [Bing] as a bargaining chip because the threat of them switching allows them to extract better conditions from Google . . . . It is no secret that Apple is making more money on Bing existing than Bing does."). In the European Union, Google's revenue-share share payments to Android partners increased after the introduction of a choice screen allowing Android users to select their

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default search engine. Tr. 9499:14–9500:9 (Rosenberg (Google)) (Google increased RSA payments in Europe as a result of the European choice screen ruling); UPX0162 at -290 (Google's first rationale for increasing RSA payments to Android partners in European countries was that the European choice screen created "opportunity for rivals to secure full Search exclusivity on devices in [European Economic Area]"); UPX0163 at -235 (Google's willingness to increase incremental payments to non-Samsung OEM Android partners driven in part by "[c]hanges to Android's business model in Europe, which have created opportunities for rivals to invest aggressively to win Search and Assistant access points").

b) Google Has Not Shown That Pass-Through Effects Would Benefit Search Consumers

1300. Even if Google's payments are to some degree passed-through to consumers in the form of lower phone prices or improved browsers, lower prices and better products benefit consumers of smartphones and browsers and not necessarily consumers of general search services or related advertising markets. Google has not shown that lower retail phone prices or improved browsers have benefited consumers in the general search market.

1301. Google argues that revenue-share payments must benefit search consumers because the total amount of searches (i.e., search output) is increasing, but that analysis is flawed. Prof. Murphy observes that output in the search market generally has increased over the years, but, as he acknowledges, his analysis does not tie that increase to phone prices. Tr. 9847:5–9848:6 (Murphy (Def. Expert)) (growth in mobile search "comes from many things," and "I can't tell you how much of that is due to that competition . . . [.]"). Nor does his analysis tie increased search output to browser improvements.

1302. Indeed, there is no evidence that the increase in search output over the years is related to decreased smartphone prices or improved browsers. Many external factors have driven

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the increase in internet searches over the years, including the growth of the internet, trends in mobile phone usage (including adoption and now ubiquity of smartphones), expanding access to broadband, and improvements in wireless telecommunications technology. Tr. 10456:17–10458:18 (Whinston (Pls. Expert)) ("The internet has been expanding, connectivity has been improving . . . many, many things have contributed to the output going up.").

1303. Google's ordinary course documents do not indicate that ISAs, RSAs, and third-party browser distribution agreements increase search output. Notably, Google prepares sophisticated and detailed modeling of potential revenue share deals, and those models would be expected to factor in increases to search output if they existed. But Google's modeling does not incorporate any effect the deals have on search output. Tr. 10536:16–10538:4 (Whinston (Pls. Expert)) (discussing UPX1050 and noting that although Google made "very detailed calculations," nowhere did it account for pass-through); UPX1050 at -868. For instance, when modeling different revenue share options for Apple under the ISA, Google did not project that greater payments to Apple would result in more devices being purchased or more searches being run. Tr. 10536:16–10538:4 (Whinston (Pls. Expert)).

c) There Exist Less Restrictive Means Of Lowering Devices Prices And Improving Services

1304. There are many alternatives to Google's distribution agreements that would be less restrictive than Google's contracts and leave a "more equal playing field in terms of [general search] distribution," but still achieve Google's purported pass-through benefits. Tr. 5776:22–5778:3 (Whinston (Pls. Expert)).

1305. Google could negotiate contracts with most-favored supplier terms that continue paying out revenue-share payments, but only requiring Google to be treated on equal footing with search rivals. Contracts with those terms would permit distributors to set up choice screens,

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reducing competitive harms, while still providing a robust revenue stream for distributors. Tr. 10529:1–19 (Whinston (Pls. Expert)).

1306. Google could also negotiate unconditional revenue shares. Tr. 10529:1–19 (Whinston (Pls. Expert)). Under that arrangement, Google would pay distribution partners for Google queries through the device or through specific search access points while permitting distributors to work with competing search providers. *Id*. 10531:14–16, 10532:6–20. For example, an unconditional revenue share would permit Apple to set Google as the default search engine for most searches on Safari but set a privacy-focused GSE like DuckDuckGo as the default for private browsing modes. *Id*. 10529:20–10530:17.

1307. Unconditional revenue share arrangements are already common inside the general search services market. Bing, DuckDuckGo, and Yahoo pay for non-exclusive distribution in the United States. *Supra* ¶ 38; *e.g.* DX1005 at -158 (§5.1) (Microsoft's agreement with Mozilla, under which Microsoft pays Mozilla a [redacted]% revenue share for non-exclusive "non default" distribution in the Firefox browser); DX1011 at -322 (§1 (a)) (DuckDuckGo's agreement with Mozilla, under which DuckDuckGo pays Mozilla a [redacted]% revenue share for non-exclusive distribution in the Firefox browser); UPX0119 at -534 (showing Yahoo's "non-exclusive" syndication deal, which allows it to "choose which provider to send each query (Bing, Gemini, or Google)").

1308. Google itself uses unconditional revenue shares. In 2021, each of the carriers signed go-to-market agreements, or MSIAs, that incentivized the distribution of Android devices though payments tied to the number of Android devices on each carrier's networks. *Supra* ¶¶ 289–291. Those agreements did not require Google Search be set as the exclusive default

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search engine on qualifying devices. *Id.*; Tr. 10166:17–10168:3 (Murphy (Def. Expert)) (acknowledging that Google separated the "search part" from the Android MSIAs).

1309. Unconditional revenue-share models are also common outside the general search market and are used in legal contingency fees, sales commissions, and CEO compensation packages. Tr. 10534:18–10535:9, 10652:7–10656:10 (Whinston (Pls. Expert)).

C. Google's MADAs And RSAs Are Not Necessary For Android's Success And Do Not Benefit Search Consumers By Improving Device Quality

1310. Google has failed to show that MADA and RSA terms granting Google default exclusivity on Android devices—including the MADA's preinstallation and placement requirements and the RSA's default and search exclusivity clauses—are necessary for Google's ongoing support of the Android ecosystem, *infra* ¶¶ 1310–1320 (§ X.C.1), or have benefited consumers by improving the Android user experience, *infra* ¶¶ 1321–1344 (§ X.C.2).

1. The "Android Model" Would Not Collapse Absent Google's Restrictive Contract Terms

1311. Google's business model for the Android ecosystem (the "Android Model") would not collapse if MADAs and RSAs did not require search default exclusivity. Google has numerous reasons for supporting the Android ecosystem, including the substantial revenues Google earns from Play Store sales. Google's assertion that Android cannot compete against iOS without the MADAs and RSAs is inconsistent with the evidence and undermined by the substantial sums that Google pays Apple every year to be the exclusive default on iPhones and other Apple devices.

a) Google Has Alternative Reasons To Support Android And License The Play Store For Free

1312. Google has a strong incentive to invest in Android, regardless of whether search rivals have their GSEs pre-installed on those devices. Google uses the Android platform to

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distribute flagship, non-search applications that generate substantial revenue for the company, including YouTube, Google Maps, Gmail, and Google Drive. Tr. 9572:1–16 (Rosenberg (Google)) (agreeing that Google selects apps for the MADA bundle based in part on whether they "generate revenue for Google"); Tr. 7716:12–18, 7717:2–12 (Pichai (Google)) (Google generates revenue through distribution of core applications required by the MADA, including Gmail and Google Drive.); UPX0296A at -500 (listing "generate revenue for Google" as the first guiding principle for determining which new apps to include in the MADA bundle); UPX0286 at -211 ("Secure more users for Google services through the Android mobile platform via pre-loads, default intents, and/or exclusivity for over 30 Google mobile internet services."); UPX6059 at -034 (Google's 2021 10-K showing that YouTube ads revenue increased from roughly $20 billion in 2020 to more than $28 billion in 2021).

1313. Google's Play Store, which is only available on Android devices, is one of the core apps that generates revenue for Google. Tr. 9553:12–16, Tr. 9551:5–18 (Rosenberg (Google)) (Google generates revenue from the Play Store through transaction fees on payments for and within apps, in addition to revenue from displaying ads in the Play Store). In one 2020 estimate, Google projected it would earn upwards of $[redacted] billion from Play Store sales on Samsung phones over a four-year deal. UPX2111 at -120; UPX0317 at -155 (showing $[redacted] billion in Play Store revenue in 2019).

1314. The more consumers buy Android phones the more money Google makes from Play Store sales. Tr. 9553:17–19 (Rosenberg (Google)). If consumers switch from an Android phone to an iPhone, Google loses all potential Play Store revenue from that user, although the ISA allows Google to retain those users' search queries on iOS. *Id*. 9553:20–23; UPX2111 at -099 ("If we lose share, we lose Play revenue, and our Search TAC goes up to whatever the

[redacted]

Apple rate is. We still get Search revenue; it's just more expensive."). As Mr. Rosenberg explained, "[Google] certainly ha[s] commercial interest in seeing Android succeed because of Play." Tr. 9556:10–25 (Rosenberg (Google)).

1315. Sales of Google-manufactured Pixel phones, which run on Android, generate substantial revenue for the company. UPX0317 at -159 (showing Pixel's "OEM shipment share" in United States increased from 17% in 2018 to 20% in 2019); UPX6059 at -007 (Google 10-K noting, under the "Hardware" category, that Google generates revenues from Pixel phones). These products collectively make Android incredibly lucrative for Google, even exclusive of revenue Google earns from searches run on Android devices. UPX6059 at -031, -034 (Google's 2021 10-K showing that the "Google other" category—which includes Play Store revenues, Pixel phone sales, and YouTube non-advertising revenues—generated $28 billion).

1316. Google has not shown that Android smartphone sales would suffer if Google could no longer exclude competing GSEs from those devices. The evidence indicates the opposite; after Google implemented a choice screen in Europe, Android's market share has declined less there than it has in the United States. Tr. 10593:2–10594:15 (Whinston (Pls. Expert)). Similarly, Android's market share in Russia has increased since Google implemented a choice screen there. *Id.*

1317. Google's competition with Apple also provides Google an incentive to continue investing in Android. If Apple released its own GSE and set it as the default on all Apple devices, Google would make substantially less money from searches run by Apple users. Tr. 10538:5–10539:13 (Whinston (Pls. Expert)); *supra* ¶¶ 1093–1124 (§ VIII.B.3). That would drastically increase Google's incentive to invest in Android, because it makes more money on Android phones than on Apple devices. *Id.*

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b) Google's Purported Interest In Promoting Android's Competitiveness Is Undermined By Its ISA Payments To Apple

1318. Google's revenue share agreements with Apple undermine its search-based incentive to invest in Android. Tr. 10538:5–10539:13 (Whinston (Pls. Expert)).

1319. Google's revenue-share payments to Apple under the ISA provide billions in capital to Google's chief competitor in the smartphone market, yet Google is blithely unconcerned about strengthening Apple as an Android rival. Tr. 4974:9–14 (Braddi (Google)) (Google has never discussed any concern over how sharing billions in revenue with Apple makes Apple a stronger competitor in phone market.); Tr. 9566:20–9567:2 (Rosenberg (Google)) (recalling no discussions about halting Google payments to Apple); UPX0643 at -305 (noting Samsung's argument that Google is giving Apple a better deal than Samsung, making it more difficult for Samsung to compete with Apple).

1320. By controlling the search defaults on both Apple and Android devices, Google Search bears little risk. When Android users switch to the iPhone, Google still gets substantial revenue as the default search engine on iPhones. UPX2111 at -099 (If an Android user switches to the iPhone, Google "still get[s] search revenue; it's just more expensive."); UPX0076 at -215 (showing iOS search revenue as roughly equal to Android search revenue).

c) Absent Exclusivity, Google Would Continue To Pay Revenue Share

1321. That Google's search rivals pay for nonexclusive search suggests Google would have an incentive to continue paying for search distribution absent default exclusivity on Android devices. Bing, DuckDuckGo, and Yahoo pay for non-exclusive distribution in the United States, including for searches on Apple devices and Mozilla's Firefox browser. *Supra* ¶¶ 38, 1307. In Russia, Yandex pays a 20% revenue share when users select Yandex from the Android choice screen. UPX0170 at -975 ("Yandex . . . pays Google a 20% TAC for search

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traffic on new devices if a user chooses Yandex . . . as default . . . and clicks on ads served by them.”).

2. There Is No Compelling Evidence That MADAs And RSAs Benefit Consumers In The Search Market

1322. Google has not shown that MADA and RSA terms that grant Google default search exclusivity on Android devices benefit consumers, including by improving the user experience and thus the competitiveness of Android devices. Even if Google had, those purported procompetitive justification do not justify harms to consumers in the general search services market.

a) The MADA And RSA Do Not Benefit Consumers

i. The MADA’s And RSA’s Preinstallation, Placement, Default, And Exclusivity Terms Do Not Improve The Customer Experience On Android Devices

1323. Google has not shown that its preload, placement, and default provisions improve the customer experience on Android devices.

1324. To the contrary, Google’s MADA and RSA terms lead to a poorer user experience in several ways. Both Android OEMs and Android users have complained about the placement of the Google Search Widget across the home screen of Android smartphones. UPX0128 at - 547 (email from Hiroshi Lockheimer stating, “1) Users generally are tired (visually) of our widget. It’s in the middle of the screen, obscures your family picture, etc.” and “2) OEMS are VERY tired (visually) of our widget, because of 1) and also because they feel like they don’t get to differentiate.”); Tr. 10099:2–23 (Murphy (Def. Expert)) (OEMs may not want to preinstall Google’s widget but do so in exchange for the benefits gained under the MADA.); UPX0653 at -053 (“If removable, [around] 20% of users delete widget within 3 months of device activation.”).

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1325. The MADAs and RSAs also frustrate distribution partners' ability to differentiate their products. Android OEMs, such as Samsung and Motorola, compete against each other by differentiating their devices, which can lead to innovative and compelling user experiences. Tr. 9574:22–9575:4 (Rosenberg (Google)) (Android manufacturers compete by differentiating their devices, and "innovation is one of the ways they can differentiate."); Tr. 10098:3–7 (Murphy (Def. Expert)) ("There certainly are dimension[s] in which [Android OEMs] benefit from differentiation."). For example, the foldable phones now offered by Samsung, Google, and Motorola are an innovation that resulted from OEMs competing through differentiation. Tr. 9574:22–9575:4 (Rosenberg (Google)).

1326. Google's preinstallation, placement, default, and exclusivity terms thwart differentiation by standardizing features between devices. UPX0997 at -059 (discussing Google and AT&T's "philosophical differences on the UX on Android" and AT&T's desire to "differentiate the experiences so not all Android devices look the same"). Google's distribution partners routinely complain that MADAs and RSAs leave them with little control over the user experience on their devices. UPX0482 at -727 (Google Search deals leave T-Mobile "absolutely no control over the customer experience or monetization. Google is the one that controls both."); UPX1036 at -835 (T-Mobile executives expressing frustration with, among other things, Google "trying to mandate with exclusivity and control").

1327. For instance, T-Mobile explored building a federated search experience in which it would provide search results, if responsive to a user query, from Bing, Amazon, and Branch. Des. Tr. 181:4–183:15 (Giard (T-Mobile) Dep.). T-Mobile believed it could have created a better search experience for consumers, as well as improved monetization for T-Mobile, but even experimenting with a federated search experience was blocked by T-Mobile's 2017 RSA. *Id.*

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Similarly, Samsung and AT&T both expressed interest in preloading expanded versions of Branch's app-search tool that included additional functionality but were deterred by concerns over violating their RSAs' search exclusivity clauses. Des. Tr. 247:6–249:25 (Ezell (AT&T) Dep.) (explaining decision to walk away from expanded Branch partnership); UPX1064 at -543 (Samsung email expressing concern over Branch features that Google could characterize as "web search").

1328. Google's distribution partners have sufficient incentive to ensure a consistent and secure user experience without the MADAs and RSAs. Tr. 10539:21–10540:10 (Whinston (Pls. Expert)); Des. Tr. 273:15–274:23 (Giard (T-Mobile) Dep.) (A consistent user experience is in T-Mobile's interest.); Des. Tr. 291:24–292:22 (Ezell (AT&T) Dep.) (Consumer experience takes precedence in business decisions.).

1329. OEMs and carriers know that if users have a poor experience on devices they purchase, users may blame the responsible OEM and carrier and users will shift their business to competitors. Des. Tr. 62:24–63:10 (Giard (T-Mobile) Dep.). Moreover, users confused about how to use their devices may call carriers' customer care lines, which increases costs to distributors. *Id.*

1330. Although carriers have an interest in earning revenue shares from Google, the carrier device sale and services efforts represent a small portion of the carriers' overall business. Des. Tr. 289:4–291:11 (Ezell (AT&T) Dep.) (estimating that revenue share payments AT&T receives total less than [redacted]% of its wireless service revenue). As Mr. Ezell explained, AT&T and the other carriers' priority is being competitive in their core business of offering wireless services. *Id.* Carriers would not take steps that would drive customers to competitors, including distributing devices with poor user interfaces. Des. Tr. 62:24–63:10 (Giard (T-Mobile) Dep.).

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ii. The "MADA Barter" Does Not Enable The Sale Of Low-Cost Devices

1331. Google has not shown that the "MADA Barter" has enabled the sale of low-cost Android devices. Google presented no evidence of a causal link between the MADA and the existence of low-priced Android phones.

1332. Although Prof. Murphy testified that such a link exists, he acknowledged that he is not aware of data showing one. Tr. 10185:25–10186:13 (Murphy (Google's Expert)). He also has seen no ordinary-course documents linking the MADA with the sale of low-cost Android phones. *Id*. 10187:3–8. Prof. Murphy has not quantified how many, if any, low-priced Android devices would leave the U.S. market if the MADA bundle was disallowed. *Id*. 10187:9–15.

1333. As compared to less restrictive alternatives, the "MADA barter" is also inefficient because it requires the same "price" for every Android device. Tr. 10540:11–10541:9 (Whinston (Pls. Expert)). Currently, Google bundles all its GMS services, requiring the same placement and preload terms—e.g., placement of the Google Search Widget on the homepage—for every device regardless of its features and capabilities. Every Android smartphone, no matter its size, cost, features, or other characteristics, must accept these conditions as "payment" for the Play Store. This makes less sense for certain devices, including those that have lower prices, fewer features, and storage and processing constraints. By contrast, licensing the Play Store separate from other GMS apps would provide Google and Android OEMs greater flexibility to tailor any "payment" for the Play Store according to the circumstances of the particular device. *Id.*

1334. Google has unbundled the MADA in Europe, permitting OEMs to license the Play Store directly. Tr. 10158:7–10159:1 (Murphy (Google's Expert)). Google licensed the Play Store for different amounts depending on the country in which the device was being sold and the features that were available on the phone. Tr. 10540:11–10541:9 (Whinston (Pls. Expert)).

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iii. RSAs Do Not Prevent Opportunistic Behavior

1335. There is no persuasive evidence to support Prof. Murphy's opinion that RSAs' search exclusivity clauses prevent Android OEMs and carriers from acting opportunistically.

1336. On balance, Google employees do not appear concerned about distribution partners acting opportunistically. Tr. 10177:21–10178:11 (Murphy (Google's Expert)). Materials shared with senior Google executives, including Ms. Porat, do not include preventing free riding or opportunistic conduct among the rationales in support of RSAs. *Id.*; UPX1128 at -097 (providing rationales for new Android carrier and OEM RSAs).

1337. Google's search rivals also are not concerned about distribution partners acting opportunistically. Bing, DuckDuckGo, and Yahoo pay for distribution in the United States, including for searches on Apple devices, without the guarantee of search exclusivity. *Supra* ¶¶ 38, 1307.

1338. Prof. Murphy's opinion is inconsistent with his opinion that Google's Android agreements do not harm competition for search services. If Prof. Murphy is correct that distribution partners have no desire to work with Google's search rivals, there is no risk that distribution partners would steer queries toward those services and therefore no risk of them acting opportunistically. Likewise, if Prof. Murphy is correct that distribution partners are not interested in splitting queries between multiple search providers, there is no risk of distribution partners acting opportunistically. Tr. 10193:7–17 (Murphy (Google's Expert)) (not aware of any instance in which a browser split queries between multiple search engines).

b) Even If There Was Evidence Of MADA's And RSA's Procompetitive Justifications, They Do Not Justify Harms To Search Consumers

1339. Even if Google had demonstrated that the MADA and RSA preinstallation, placement, default, and exclusivity terms improve the customer experience on Android devices

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(which it has not), Google's purported justifications would not justify harms Google causes to consumers in relevant markets because (1) benefits to consumers in the general search services market are speculative at best; and (2) there are less restrictive means of increasing consistency and improving the user experience on Android devices.

i. Benefits To Search Consumers Are Speculative

1340. Improvements to the user experience on Android devices caused by the MADA and RSA, if any, inure to consumers outside the general search and related advertising markets. Google has not shown that those alleged improvements increase search output and, if so, by how much.

1341. Google identifies no evidence showing that the search-related provisions in the MADA and RSA have on balance improved the user experience on Android devices.

ii. Less Restrictive Means

1342. Google would continue to earn substantial revenues from Android users if Google offered an unconditional revenue share, or payments conditioned on a choice screen, and both alternatives would allow Google to encourage device improvements without foreclosing competition. Tr. 5776:22–5778:3, 10529:1–10530:17 (Whinston (Pls. Expert)) (discussing less restrictive alternatives).

1343. Encouraging Android OEMs and carriers to take user-enhancing actions, like making regular security updates, does not require Google to exclude other GSEs from Android devices. Android OEMs and carriers have independent incentives to push out security updates and ensure users have a high-quality phone experience. Tr. 7717:13–7718:15 (Pichai (Google)); *id*. 7658:17–7659:12.

1344. There is no technical reason user-enhancing actions, including security updates, must be tied to search defaults or exclusivity. Tr. 9564:3–15 (Rosenberg (Google)). As Google

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acknowledged at trial, it could use other models—including unconditional revenue shares or other financial incentive—to encourage Android partners to make timely security updates. Tr. 7718:16–7719:1 (Pichai (Google)); Tr. 9564:16–25 (Rosenberg (Google)).

XI. GOOGLE'S EMBEDDED HEARSAY OBJECTIONS ARE MERITLESS

1345. At trial, Google and Plaintiffs reserved generalized objections to embedded hearsay in more than 100 exhibits otherwise admitted into evidence. Plaintiffs' Proposed Findings of Fact have cited approximately 90 exhibits that Plaintiffs understand are subject to Google's generalized objection.[17] Google's counsel has indicated that Google plans to specify its particularized objections to Plaintiffs' use of these documents after reviewing Plaintiffs' Proposed Findings of Fact. Tr. 10229:4–10230:12. Accordingly, to meaningfully respond to Google's objections, Plaintiffs await Google's particularized objection to these exhibits (to the extent those objections remain). Similarly, Plaintiffs reserve the right to renew their own objections to Google's exhibits after reviewing Google's post-trial filings.

[17] Plaintiffs' review identified the following exhibits: UPX0014, UPX0061, UPX0081, UPX0094, UPX0105, UPX0107, UPX0126, UPX0135, UPX0164, UPX0172, UPX0183, UPX0236, UPX0244, UPX0279, UPX0290, UPX0305, UPX0321, UPX0482, UPX0495, UPX0511, UPX0536, UPX0556, UPX0557, UPX0558, UPX0567, UPX0574, UPX0605, UPX0620, UPX0622, UPX0627, UPX0628, UPX0640, UPX0654, UPX0656, UPX0658, UPX0663, UPX0664, UPX0666, UPX0667, UPX0669, UPX0671, UPX0676, UPX0677, UPX0678, UPX0687, UPX0690, UPX0692, UPX0716, UPX0720, UPX0736, UPX0751, UPX0787, UPX0798, UPX0829, UPX0832, UPX0848, UPX0851, UPX0898, UPX0914, UPX0920, UPX0921, UPX0940, UPX0955, UPX0964, UPX0967, UPX0979, UPX0982, UPX0991, UPX0997, UPX1015, UPX1017, UPX1018, UPX1019, UPX1020, UPX1024, UPX1032, UPX1033, UPX1034, UPX1035, UPX1036, UPX1038, UPX1062, UPX1064, UPX1070, UPX1086, UPX1102, UPX1125, UPX1130, UPX2106, UPX2143, UPX8091.

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Appendix: Cited Exhibits Used With A Witness

Cited Exhibits Used With A Trial Witness

Witness	Transcript	Transcript Pages	Exhibits Cited in Proposed Findings
Amaldoss, Wilfred	10/24 (PM), 10/25 (AM)	6856–7012	N/A
Austin, Alex	9/27 PM, 9/28 AM	2891-3076	UPX1064, UPX0656, UPX1064, PSX00075, DX0612
Baker, Jonathan	10/25 (AM & PM), 10/26 AM	7014–7284	N/A
Baker, Mitchell (video)	11/1 (PM)	8354–8356, ECF #756-2	UPX0979, UPX1070
Barrett-Bowen, Neil	10/17 PM	6168–6239	N/A
Barton, Chris	9/13 (AM)	312–371	UPX0134, UPX0544, UPX5533, JX0011
Booth, Ryan	10/11 AM	5112–5225	PSX00676, DX2021
Braddi, Joan	10/10 AM & PM	4924–5081	UPX0072, UPX0137, UPX0309, UPX0552, UPX0570, UPX0605. UPX0615, UPX0670, UPX0672, UPX0675, UPX0679, UPX0895, UPX0911, UPX1110, UPX2010, UPX2011, UPX2014, UPXD007, JX0024, JX0033
Chang, Patrick	10/5 AM & PM	4483–4594	UPX0663, UPX0690, PSX00952
Christensen, Eric (video)	11/1 (PM)	8351–8354, ECF #756-2	N/A
Cue, Eddie	9/26 AM & PM SEALED & PUBLIC	2449-2639	UPX0273, UPX0588, UPX0594, UPX0613, UPX0614, UPX0625, UPX0626, UPX0631, UPX0790, UPX1109, UPX4001, UPX8105, UPXD009, JX0033, JX0097
Dijk, Arjan	10/11 AM & PM	5226–5368	DX3114, DXD-3
Dischler, Jerry	9/18 AM & 9/18 PM SEALED , 9/19 AM & PM PUBLIC	1126–1509	UPX0001, UPX0012, UPX0036, UPX0423, UPX0436, UPX0461, UPX0489, UPX0519, UPX0522, UPX2001, PSX00191, PSX00267, DX0187, DX0231, DXD-03
Ezell, Jeffery (video)	11/9 (AM)	9628–9630, ECF #771-3	N/A
Fitzpatrick, Jennifer	11/6 (PM)	8985–9084	UPX0981, UPX0996, UPX1044
Fox, Edward	10/30 (PM), 10/31 (AM)	7807–8006	DXD-17
Giannandrea, John	9/21 PM PUBLIC, 9/22 AM	2163–2370	UPX0205, UPX0235, UPX0240, UPX0260, UPX0266, UPX0460, UPX0494, UPX0618, UPX0659, UPX0797, UPX1123, UPXD004, UPXD005, UPXD006, UPXD007, DX0374, DX0376
Giard, Jeffrey (video)	11/8 (PM)	9589–9591, ECF #771-1	N/A
Gomes, Benedict	10/31 (AM & PM)	8006–8159	UPX0749, UPX2044
Higgins, Brian	9/18 AM	1019–1119	UPX0304, UPX0495, UPX0642, UPX1026, JX0016, JX0026, JX0093
Holden, Richard	11/7 (AM & PM Public)	9137–9311	PSX00385, PSX00524, DXD-31
Hurst, Jeff	10/19 AM	6499–6580	DX0308

[redacted]

Witness	Transcript	Transcript Pages	Exhibits Cited in Proposed Findings
Israel, Mark	11/2 (AM & PM), 11/3 (AM), 11/6 (AM & PM)	8375–8985	UPX0006, UPX0028, UPX0049, UPX0059, UPX0214, UPX0344, UPX0472, UPX0475, UPX0811, UPX2022, UPX2076, UPX2079, PSX00562, DXD-21
Jerath, Kinshuk	10/11 PM, 10/12 AM & PM	5369–5661	UPXD103, UPX0526, DX0187, DX0412
Juda, Adam	10/3 PM, 10/4 AM & PM	3986–4304	UPX0008, UPX0009, UPX0010, UPX0032, UPX0043, UPX0059, UPX0459, UPX0465, UPX0467, UPX0509, UPX0811, UPX0842, UPX0889, UPX0925, UPX1045, UPX6058, DXD-11
Kartasheva, Anna	9/27 AM & PM	2780-2891	UPX0131, UPX0150, UPX0609, UPX0664, UPX0694, UPX1067, UPX2003, JX0071
Kolotouros, Jim	9/14 PM, 9/15 AM	771–983	UPX0076, UPX0125, UPX0129, UPX0149, UPX0161, UPX0320, UPX0558, UPX0569, UPX0608, UPX0616, UPX0643, UPX0710, UPX0713, UPX0741, UPX0853, UPX1011, UPX1077, UPX1088, UPX5399, UPX8071, JX0049, JX0099, DX0738
Krueger, Jason	10/24 AM & PM	6745–6855	N/A
Krueger, Ryan	10/4 PM, 10/5 AM	4305–4481	N/A
Lehman, Eric	9/20 PM, 9/21 AM	1748–1935	UPX0004, UPX0005, UPX0192, UPX0197, UPX0203, UPX0204, UPX0213, UPX0219, UPX0228, UPX0255, UPX0268, UPX0974, UPX1115
Levy, Daniel (video)	11/9 (AM)	9627, ECF #771-2	UPX0445, UPX1014, UPX2113, UPX2114, UPX2116, UPX2117
Lim, Tracy-Ann	10/10 AM	4836–4923	UPX0441, DX0663
Lowcock, Joshua	10/3 AM & PM	3800–3984	UPX0012, UPX0450, UPX0926, DXD-03
McCallister, Adrienne	11/7 (PM Public & Sealed)	9311–9349	UPX0293, UPX2093, UPX2097
Murphy, Kevin	11/13 (AM & PM), 11/14 (AM & PM)	9681–10203	UPX0050, UPX0095, UPX0116, UPX0128, UPX0134, UPX0170, UPX0315, UPX0323, UPX0580, UPX0615, UPX0675, UPX0677, UPX0678, UPX1033, UPX1034, UPX1050, UPX1064, UPX1083, UPX1128, UPX2012, UPX2086, UPX2087, UPX2143, UPX6024, UPXD005, UPXD009
Nadella, Satya	10/2 AM & PM	3486–3665	UPX0736, DX0524
Nayak, Pandu	W 10/18 AM W 10/18 PM	6295–6473	UPX0860, UPX1082, UPX1087, UPX2022, UPX2029, UPX2033, DXD-17
Oard, Douglas	11/15 (AM & PM)	10258–10422	UPX2086, DX0469
Parakhin, Mikhail	Tu 9/26 PM PUBLIC W 9/27 AM	2640–2778	N/A
Pichai, Sundar	10/30 (AM & PM)	7637–7806	UPX0123, UPX0126, UPX0137, UPX0172, UPX0617, UPX0973, UPX1092, UPX1101, UPX2049, UPX2050

[redacted]

Witness	Transcript	Transcript Pages	Exhibits Cited in Proposed Findings
Raghavan, Prabhakar	10/26 (AM & PM), 10/27 (AM)	7289–7602	UPX0033, UPX0223, UPX0342, UPX0344, UPX0453, UPX0500, UPX0501, UPX0714, UPX0734, UPX0811, UPX2040, UPX2041, UPX2051, UPX7002, UPX7002A, UPX8082, PSX01217, PSX01218, DX0183, DX0231, DXD-21
Ramaswamy, Sridhar	M 10/2 PM Tu 10/3 AM	3666–3799	UPX0093, UPX0123, UPX0475, UPX0940
Rangel, Antonio	9/13 (PM), 9/14 (AM & PM)	515–771	UPXD101, DXD-01
Reid, Elizabeth	11/1 (AM & PM)	8196–8349	UPX0023, UPX2065
Rosenberg, Jamie	11/8 (AM & PM)	9409–9588	UPX0129, UPX0296A, UPX0706, UPX0997, UPX2091, UPX2111
Roszak, Mike	9/19 PM PUBLIC, 9/20 AM & PM	1533–1744	UPX0002, UPX0038, UPX0066, UPX0085, UPX0097, UPX0148, UPX0249, UPX0323, UPX0462, UPX0674, UPX1050
Tinter, Jon	9/28 AM & PM, 9/29 AM	3088–3428	UPX0115, UPX0116, UPX0133, UPX0246, UPX0301, UPX0797
Vallez, Paul	10/19 AM & PM	6581–6670	N/A
Varia, Amit	10/6 AM	4683–4757	N/A
Varian, Hal	9/12 (PM), 9/13 (AM & PM)	137–272, 373–508	UPX0026, UPX0123, UPX0151, UPX0178, UPX0180, UPX0184, UPX0334, UPX0340, UPX0411, UPX0452, UPX0472, UPX0499, UPX0856, UPX0862, UPX0884, UPX0902, UPX0910, UPX1001, UPX1066, UPX1085, UPX7001
Weinberg, Gabriel	Th 9/21 AM & PM SEALED & PUBLIC	1936–2159	UPX0666, UPX0667, UPX0818, UPX1012, UPX1112
Whinston, Michael	10/5 PM, 10/6 AM, 10/16 AM & PM, 10/17 AM & PM, 11/16 AM & PM	4594–4798, 5711–6165, 10451–10662	UPXD102, UPXD104, UPXD106, DXD-15
Yoo, John	9/19 PM PUBLIC & SEALED	1510–1533, 4–28 (SEALED)	UPX0129, UPX0141, UPX0146, UPX0312, UPX0316, UPX1107

[redacted]

Cited Exhibits in Designated Deposition Testimony[18]

Witness	Exhibits Cited in Proposed Findings
Alberts, Brendan	UPX8099, UPX8100
Baker, Mitchell	UPX0105, UPX0851, UPX0898, UPX0979, UPX1070, DX1012
Baxter, Timothy	N/A
Christensen, Eric	N/A
Christensen, Jeff	N/A
Chu, Penny	UPX0348, UPX0499, UPX0849
Connell, Derrick	N/A
Cue, Eduardo (30(b)(6))	UPX0594, JX0001, JX0002, JX0004, JX0009, JX0024
Dacey, Matthew	N/A
Daniels, Alexander	N/A
Edwards, Catherine	UPX0732, UPX0740, UPX0768, UPX0795
Ezell, Jeffrey	N/A
Fox, Nicholas (30(b)(6))	UPX0351
Fox, Nicholas	UPX0339, UPX0419, UPX0719, UPX0763, UPX0794*, UPX0810*
Geurin, Neil	N/A
Giard, Jeffrey	UPX0482, UPX1036
Grey, Rachel (30(b)(6)) (2021)	N/A
Grey, Rachel (30(b)(6)) (2022)	N/A
Heath, Shirley	N/A
Indacochea, Eduardo	N/A
Jain, Sundeep	UPX0438*, UPX0746, UPX0779
James, Mike	UPX0061, UPX0443, UPX0511
Lagerling, John	N/A
Levine, Zahava	UPX0287, UPX0321, UPX0567
Levy, Daniel	UPX0445, UPX0914, UPX0923, UPX1014*, UPX1015*, UPX1018, UPX1019, UPX1020, UPX2113, UPX2114, UPX2116, UPX2117
Lien, Chris	N/A
McAteer, John	N/A
Miller, Andrew	UPX0046, UPX0335, UPX0418, UPX0514, UPX0521, UPX0738, UPX2019, UPX2020, PSX00562
Moxley, Emily (30(b)(6))	N/A
Moxley, Emily	UPX0278, UPX0749, UPX0762, UPX0765
Nayak, P. Pandurang (30(b)(6))	N/A
Osmond, Charlie	N/A

[18] Exhibits marked with an asterisk mean the deposition exhibit is part of the trial exhibit, however there are differences (e.g., the deposition exhibit appears as an attachment, the trial exhibit is in a native format), or the deposition exhibit contains metadata slipsheets not included in the trial exhibit.

[redacted]

Witness	Exhibits Cited in Proposed Findings
Perica, Adrian	UPX0460, UPX0635
Porat, Ruth	UPX0580, UPX0603, UPX0639, UPX0752, UPX6059
Ramalingam, Ramesh	UPX0829, UPX0832
Raymond, Christie	DX0412
Ribas, Jordi	DX0524
Richardson, Yuki	UPX0322, UPX0325*, UPX0326
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Stein, Mark	N/A
Stoppelman, Jeremy	N/A
Utter, Brian	N/A
van der Kooi, Rik	UPX1058*
Vlahov, Atanas (30(b)(6))	UPX0725