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]

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I. PLAINTIFFS HAVE NOT ESTABLISHED CAUSATION NECESSARY TO SUPPORT THEIR RPFJ.

A. Plaintiffs Have Not Proven That Absent the Provisions Deemed Exclusive in Google's Search Distribution Agreements Google Would Not Have Maintained Monopoly Power in the Relevant Markets.

1. During the liability phase, Plaintiffs never alleged, let alone proved, that Google unlawfully *acquired* a monopoly in any market. Liability Op. at 202.

2. Plaintiffs repeatedly disclaimed any need to prove that Google's monopoly status was achieved through the challenged conduct. Liability Tr. 6037:25-38:3 (Whinston (Plaintiff Expert)); Liability Tr. 9:10-23 (DOJ Opening) ("[A] monopoly maintenance case doesn't attack or address how they rose to monopoly prominence so" "we will not be . . . seeking to establish that").

3. During the liability phase, Plaintiffs urged the Court that it did not need to find but-for causation to show anti-competitive effects. Plaintiffs' Post-Trial Brief (ECF No. 820) at 50; Plaintiffs' Response to Defendant's Proposed Conclusions of Law (ECF No. 854) at 8 ("The Law Does Not Require Plaintiffs To Prove A But-For World.").

4. And Plaintiffs' experts measured market foreclosure based solely on the "coverage" of the agreements, not against the but-for world. Liability Tr. 5752:18-53:1 (Whinston); Plaintiffs' Proposed Conclusions of Law (ECF No. 821) at 19-20.

5. The Court applied a "relaxed" liability causation standard, whereby in cases "seeking only injunctive relief," "[c]ourts may infer causation from the fact that a defendant has engaged in anticompetitive conduct that reasonably appears capable of making a significant contribution to maintaining monopoly power." Liability Op. at 215 (cleaned up). The Court likewise accepted Plaintiffs' "coverage" estimate for foreclosure under the relaxed liability standard the Court applied. Liability Op. at 222, 259.

6. In the remedies phase, Plaintiffs presented expert economic testimony that antitrust remedies should be limited to restoring competition "to where it would have been without the conduct." Tr. 2207:1-14, 2133:9-16 (Chipty (Plaintiff Expert)) ("The goal . . . is to restore the competitive rivalry that was diminished by the dominant firm's anticompetitive conduct."); Tr. 4631:8-19 (Chipty).

7. To "restor[e] competition to where it would have been without the alleged unlawful conduct, you need to understand and assess *the extent* to which the conduct resulted in anticompetitive effects." Tr. 2207:7-14 (Chipty) (emphasis added).

8. Importantly, Dr. Chipty agreed that "it would make sense that [Professor Murphy] would endorse" Google's remedies if you "would not expect the but-for world to be *substantially different* from the actual world" (i.e., if there is "close proximity" between the "but-for world and the actual world"). Tr. 4600:5-02:17 (Chipty) (emphasis added).

9. Accordingly, it "would make sense to pursue stronger remedies" only if "what actually happened is significantly different from what would have happened." Tr. 4600:5-01:12 (Chipty).

10. Professor Murphy testified similarly as to the economic rationale for antitrust remedies. "Corrective" remedies benefit competition by removing the conduct that was found to harm competition. As a result, they can restore competition without *measuring* the harm from that conduct. Tr. 4202:9-07:10 (Murphy); RDXD-33.006.

11. By contrast, "restorative" remedies are justified only when there is a "[s]trong causal connection" evidenced between the conduct found anti-competitive and market outcomes (such as shifts in shares), past distortion of market outcomes substantially impairs competition going forward, and corrective remedies are insufficient to rectify this harm. Even when those

prerequisites are met, because restorative remedies interfere with the competitive process and therefore can harm consumers, the "benefits of that restoration" must "exceed the costs" of "interfering in the competitive process." Tr. 4213:18-14:19 (Murphy); RDXD-33.006-.007.

12. When there is no showing of a strong causal connection, remedies that go significantly beyond enjoining the anti-competitive conduct are better characterized as non-remedial regulatory interventions. That is, they are an attempt to engineer market outcomes disconnected from the conduct or the competitive process, including attempting to remove "natural" or "inherent" barriers to entry. Tr. 4207:11-25 (Murphy); RDXD-33.006.

13. At the remedies proceeding, Plaintiffs offered no evidence of a significant causal connection between the conduct found anti-competitive and the maintenance of monopoly power. Dr. Chipty performed no causation analysis, instead simply relying on her interpretation of the Court's opinion. Tr. 2134:3-8 (Chipty) ("I take the Court's opinion to mean that there's a significant difference between what actually happened and what would have happened absent the anticompetitive conduct."); Tr. 2230:23-31:5 (Chipty) ("Q. . . . [Y]ou have not made a determination of what specific impact Google's distribution agreements had on relative scale? A. I have not provided a quantification, nor I don't think it's possible in this case. But, like, I did take the Court's opinion to mean that there is a significant difference between how the world played out and how it would have played out.").

B. The Proper But-For World Against Which to Determine the Nature and Extent of Causation Includes Google Competing for Non-Exclusive Default Agreements.

14. In both the liability and remedies phases, Plaintiffs' experts agreed that the effects of anti-competitive behavior in principle should be examined relative to a but-for world. Liability Tr. 5774:14-18 (Whinston); Tr. 2207:15-22 (Chipty) (agreeing that "[a]ssessing the competitive effects of behavior in the market is ideally examined relative to a but-for world").

15. The conduct the Court found anti-competitive consisted of provisions in distribution agreements that the Court found to make the contracts exclusive. Liability Op. at 204-05, 210, 214. The anti-competitive conduct did not include paying for preinstallation, placement, or defaults absent the exclusive element found by the Court.

16. It is undisputed that Google would have paid for *non-exclusive* default distribution in the but-for world. Tr. 2208:10-22 (Chipty); *see also* Liability Op. at 249 ("[A] non-exclusive default would still provide all the convenience and efficiency benefits that Google touts," and "Plaintiffs are not challenging the concept of a search default or that distributors may recommend a search engine, set a search default, or preinstall search access points.").

17. Therefore, anti-competitive effects must be measured against the world in which Google paid for *non*-exclusive preinstallation, defaults, and distribution of search. Tr. 2208:10-22 (Chipty); Tr. 4216:24-17:17 (Murphy); RDXD-33.010.

C. Google Succeeded Both Before and During the Monopoly Maintenance Period by Creating the Highest Quality Search Engine with the Best Monetization.

18. It is undisputed that Google's superior quality and monetization would have resulted in Google winning *non-exclusive* distribution during the period of monopoly maintenance. Tr. 2305:19-06:9 (Chipty) ("[A]s long as Google can pay for those defaults, Google having the quality advantage today and also Google having the monetization advantage today, it's reasonable to expect that the significant defaults would be won by Google."); Tr. 4223:16-25:2, 4328:19-29:10 (Murphy) (concluding that "exclusivity per se would have had a . . . quite small effect on rival shares" and that "Google had . . . the quality and monetization advantages in the but-for world"); RDXD-33.011; RDXD-33.021.

19. Plaintiffs' experts opined on Google's conduct only as far as back as *2014*. Liability Tr. 6037:10-19 (Whinston) (analysis starting in 2014); Liability Tr. 7243:24-44:1 (Baker (Colorado Expert)) (analysis starting in 2016).

20. But Google achieved its quality advantage long before the early 2010s. Tr. 2309:19-22 (Chipty) ("Q. . . . For the last 20 years, Google has had the best search engine; correct? A. Yes."); Liability Op. at 1 ("For more than 15 years, one general search engine has stood above the rest: Google.").

21. Google Search became the most popular general search engine ("GSE") by the mid-2000s with no distribution advantages. Liability Op. at 1 ("In 2009, 80% of all search queries in the United States already went through Google.").

22. Google achieved its superior quality by innovating from the very beginning, and it has continued innovating throughout. Liability Op. FOF ¶ 128 ("Google's superior product quality rests in part on its numerous innovations . . . ."); *id.* at 247 ("Google has not sat still . . . . "); Defendant's Liability Proposed Findings of Fact (ECF No. 828) ¶¶ 91-170 (describing Google's numerous innovations).

23. Plaintiffs offered no evidence of the extent to which Google's quality is attributable to innovation versus scale, much less any scale gained from challenged aspects of Google's contracts (compared to non-exclusive distribution in a but-for world). Tr. 2228:6-13 (Chipty) ("[Q.] You don't know how much of search quality is attributable to just query scale versus the development of all sorts of other features and innovations that are not related to scale, correct? A. No, I don't have an independent view of that.").

24. Similarly, Plaintiffs offered no evidence of the extent to which improvements in search ad monetization are attributable to scale versus non-scale factors, or of any innovation in search ads that rivals did not pursue due to a lack of distribution. Tr. 4620:16-21:20 (Chipty).

25. Plaintiffs also offered no evidence of the percentage of tail queries that are commercial queries, and thus no evidence that any scale effect would translate into harm to search ad quality. Tr. 4623:13-24:9 (Chipty).

D. There Is No Evidence That Rivals Would Have Won Any (Let Alone Material) Default Deals Absent the Contract Provisions That the Court Found Anti-Competitive.

26. Google's partners seek to promote Google Search because they want to offer the highest quality products to their customers and be associated with a superior brand. Liability Op. FOF ¶ 133 ("Google's strong brand also benefits its partners."); Liability Tr. 7780:16-81:3 (Pichai (Google)) ("Apple benefits and sells more iPhones by having their brand associated with the quality" of Google Search); Tr. 3829:3-30:10 (Cue (Apple)) ("So we have to pick what's best for our customers, and today, that is still Google."); Tr. 3131:1-6 (Muhlheim (Mozilla)) ("[In] our experience and based upon research, Google is the preferred search engine of our users."); Standal (Opera) Dep. Tr. 31:2-20 (Opera "set[s] Google as the default search engine on its browsers" because it "provides a very high quality service"); Kim (Samsung) Dep. Tr. 30:3-19, 32:5-18, 32:21-33:2 ("I think Google has the best service, and they're reliable."); Boulben (Verizon) Dep. Tr. 125:9-26:5; Ezell (AT&T) Liability Dep. Tr. 195:7-96:2, 312:12-13:21.

27. Partners also chose Google because it monetizes better than rivals. And superior monetization reflects superior search and search ads quality. Liability Op. FOF ¶ 326 (quoting Liability Tr. 2528:13-16 (Cue) ("[Google has] the best search engine, they know how to advertise, and they're monetizing really well.")); *id.* at 231 ("[B]etter search quality attracts more users and improves monetization . . . .").

28. Partners chose not to partner with Google's rivals in part due to their inferior quality. Liability Op. at 200 (Bing and DDG "have not succeeded" in distribution efforts "in part due to their inferior quality"); Cue (Apple) (30(b)(6)) Liability Dep. Tr. 126:11-21 (Apple chose not to set Neeva as a drop-down option because "the product" was not "quite good enough to merit consideration"); Kim (Samsung) Dep. Tr. 31:6-32:4, 33:16-17, 33:20-24.

29. For instance, in 2015, Apple considered Bing as the default search engine for Safari but determined it was not high enough quality and chose instead to continue partnering with Google. These negotiations were only one year into the challenged time period (per Professor Whinston), and Plaintiffs presented no evidence that but-for the challenged conduct, Bing would have been differently situated in these negotiations. Liability Op. FOF ¶ 324.

30. Google's rivals are inferior at least in part because of their own business decisions. Liability Op. at 238 ("Microsoft 'missed' the mobile revolution and was unable to improve its browser, Internet Explorer, until it used Google's rendering engine, Chromium. Some of Microsoft's quality issues also were attributable to its poor index.").

31. There is no evidence that any browser, original equipment manufacturer ("OEM"), or carrier preferred to preload Google's rivals but was precluded from doing so because of their agreements with Google. Boulben (Verizon) Dep. Tr. 121:20-22:15, 125:9-26:5; Ezell (AT&T) Dep. Tr. 41:19-42:18; Christensen (Motorola) Liability Dep. Tr. 48:24-49:7 ("[Q.] [H]as there ever been a time where you believed that Motorola smartphone devices would be more competitive in the market if they had a search engine other than Google Search preloaded on the device? A. I'm not aware of that taking place, no."); Tr. 3820:10-21 (Cue) ("Q. At the time that Apple entered into this agreement with Microsoft [in May 2023], would Apple have preferred to set Bing as the default search engine on Safari instead of Google? A. No.").

32. As a conservative proxy for the but-for-world, the Court can look to choice screen evidence from the EU and academic studies, which show very small changes in market outcomes. Tr. 4223:13-25:12 (Murphy); RDXD-33.011.

33. As Dr. Chipty acknowledged, in determining the impact of conduct relative to a but-for world, courts and economists will often look as a "benchmark" to "different markets that are similar in a lot of respects but where the conduct occurred in one and not in the other." Tr. 4635:2-12, 4638:12-39:5 (Chipty) (acknowledging "maybe we could learn something from Europe"); RDXD-36.009-.010 (Dr. Chipty's construction of but-for world in *Sutter Health* case).

34. Dr. Chipty and Professor Rangel agree that choice screens have minimal impact on Google's market share. Tr. 2175:4-19 (Chipty); Tr. 553:15-54:16 (Rangel (Plaintiff Expert)).

35. In Europe, choice screens on Android were rolled out in 2020, and broader choice screens required by the DMA were implemented in 2024. Despite those choice screens, Google's and rivals' search shares have remained essentially unchanged. Tr. 4223:13-25:2 (Murphy); RDXD-33.011; Tr. 2187:4-17 (Chipty) ("We know from Europe that when users are given a choice today, they will overwhelmingly choose Google.").

36. And in the Allcott study relied on by Plaintiffs' experts,[1] when Bing and Google users were offered an "active choice" through a choice screen, and were provided information on how to change their default, roughly 16% of Bing users switched to Google but only about 1% of Google users switched to Bing.[2] Tr. 1967:21-24 (Luca (Colorado Expert)); Tr. 575:2-22 (Rangel); Tr. 4639:12-23 (Chipty); Tr. 4223:16-25:2 (Murphy).

[1] Tr. 544:20-46:14 (Rangel); Tr. 1892:8-97:17 (Luca); Tr. 2190:18-93:12 (Chipty).
[2] Hunt Allcott et al., *Sources of Market Power in Web Search: Evidence from a Field Experiment* (Nat'l Bureau of Econ. Rsch., Working Paper No. 33410, 2025), https://www.nber.org/system/files/working_papers/w33410/w33410.pdf (hereinafter "Allcott").

37. While Dr. Chipty and Professor Rangel suggested that the choice screen results were due in part to Google's brand advantage, neither offered any opinion regarding the extent to which Google's brand advantage is attributable to Google's lawfully acquired market position, innovations, or other lawful conduct versus any aspect of Google's contracts (compared to distribution it would have received in a but-for world). Tr. 568:5-21 (Rangel); Tr. 2225:15-26:8 (Chipty); Liability Tr. 3547:19-22 (Nadella) (agreeing that "by 2006, Google had become so popular in the United States that . . . [d]ictionaries added the word 'google' as a verb").

38. As the Court found, Google "built brand loyalty and recognition by offering a high quality product." Liability Op. FOF ¶ 130.

E. The Evidence Demonstrates Rivals Would Not Have "Chipped Away" at Google's Market Share to Any Significant Degree in the But-For World.

39. Dr. Chipty suggested the "possib[ility]" that a rival could have "secured minor defaults, niche defaults, and slowly chipped away" at Google. Tr. 2310:19-11:13 (Chipty).[3]

40. Dr. Chipty did not opine that any particular rival would have won any particular access point or "chipped away" at Google's market position. She said only that it "would have been *possible*." Tr. 2212:7-12, 2310:19-11:13 (Chipty) (emphasis added).

41. The evidence confirms that rivals would not have gained sufficient share (via these "niche" access points) in the but-for world to terminate Google's monopoly power.

42. *First*, in 2014—the earliest Plaintiffs alleged anti-competitive conduct—Yahoo won the default on Mozilla's Firefox browser in the United States. Liability Op. FOF ¶ 337.

43. By this point, Google had already achieved superior quality based on conduct not alleged or found anti-competitive. Tr. 2309:19-22 (Chipty).

[3] Underscoring the lack of rigor to this statement, this suggestion was nowhere in Dr. Chipty's expert reports, and was largely brought out only on redirect. Tr. 2310:19-11:21 (Chipty).

44. To assuage Mozilla's concerns about Yahoo's search quality, Yahoo promised to implement specific innovations to improve its quality. Baker (Mozilla) Liability Dep. Tr. 71:2-7, 71:9-72:13.

45. Despite Yahoo's access to Mozilla's users for over three years, Mozilla terminated the agreement before its expiration and reset Google as the default, due to Yahoo's continued poor quality. Liability Op. at 200; Baker (Mozilla) Liability Dep. Tr. 71:2-7, 71:9-72:13; Tr. 4229:15-30:15 (Murphy) (when "Yahoo! won the default away from Google on Firefox, and . . . got additional scale," that scale did not "lead to a further increase in Yahoo!'s market position"; instead "Yahoo! lost some users they gained initially, and Mozilla lost users because people were less satisfied with the Mozilla product"); RDXD-33.013.

46. *Second*, in 2013, Apple entered into a partnership with Microsoft under which the fallback search results for Siri, and later Spotlight, were powered by Bing. The partnership lasted until 2016. Liability Tr. 3105:8-06:11 (Tinter (Microsoft)).

47. Despite gaining access to this "alternative entry point[]", there is no evidence Microsoft "chipped away" at Google's search share; instead, Apple decided in 2016 to switch that alternative entry point back to Google based on Apple's assessment that Google would provide higher-quality results. Liability Tr. 3655:17-23 (Nadella (Microsoft)); Liability Tr. 2590:15-91:20 (Cue) ("I was very interested in replacing Bing, because the search results would be better. . . . [W]e were able to switch Siri's search results from Bing to Google, which I think improved the product . . . ."); Liability Tr. 3105:8-06:11 (Tinter).

48. *Third*, while Dr. Chipty speculates about the possibility of third parties introducing new "niche" defaults, Dr. Chipty did not identify any third party that wanted to design its product in any such way. Tr. 2221:24-24:6 (Chipty).

49. The only such access point that Plaintiffs point to is "private browsing" mode on Safari. But there is no evidence that Apple would have created this feature earlier or selected an alternative search provider for it absent the challenged aspect of its contract. Instead, as the Court found, "[u]pper-level Apple executives never genuinely considered using DDG as the default in Safari's private browsing mode . . . in part because DDG operates as 'a veneer on top of other search engines' as it syndicates its results from Bing." Liability Op. FOF ¶ 332 (quoting Liability Tr. 2352:21-53:1 (Giannandrea)).

50. Google's agreement with Apple had no impact on the timing of Apple's introduction of the feature allowing users to set a different default in private browsing, nor has it impacted Apple's decisions as to any new search access points on Safari. Tr. 3822:4-21 (Cue).

51. *Fourth*, from 2014 to 2021, Google's contracts with Verizon were not exclusive, and contained no provision that prevented Verizon from preloading a search engine other than Google or otherwise reduced the revenue share payment from Google to Verizon if Verizon did so. Nonetheless, Verizon never exercised that right. Liability Tr. 1086:20-87:20 (Higgins (Verizon)); Liability Tr. 9381:20-82:2 (McCallister (Google)).

52. Even had rivals received some additional "niche" access points, there is no evidence that this would have resulted in significant changes to the competitive landscape. Tr. 4228:23-30:15 (Murphy) (concluding from the real-world evidence that small increases in scale did "not lead to a snowball that further increases [rivals'] scale from there," which is the basis for Dr. Chipty's hypothetical "chipping away"); RDXD-33.013.

53. Plaintiffs did not attempt to show how much "scale" other search engines allegedly would have needed to reverse the lead that Google achieved prior to the monopoly-maintenance period. Tr. 2227:11-21 (Chipty).

54. Similarly, Dr. Chipty offered no opinion as to a minimum ads scale that a search engine needs to compete in the search text ads market. Tr. 4620:7-12 (Chipty).

55. Plaintiffs have offered no evidence that but for the challenged provisions, Bing or any other rival would have achieved any particular level of scale. Tr. 2228:17-20 (Chipty).

56. When Microsoft began syndicating search results and ads to Yahoo, that did not change Microsoft's incentives to innovate or create a snowball effect resulting in substantially higher search or search ads quality. Tr. 4228:23-29:14 (Murphy); RDXD-33.013.

57. This is consistent with the Allcott study relied on by Plaintiffs' experts, which found that even were Bing to achieve Google's scale, it would see only a marginal quality improvement. The study thus concluded that "[n]either feedback effects nor data sharing substantively affect market shares," because "data sharing has only a small effect on Bing's result quality in the Bing search data, and Bing's result quality has a small effect on market shares." Allcott at 5-6; Tr. 4627:4-17 (Chipty) ("Q. . . . [D]o you agree that the Allcott paper concludes that if Bing had had access to the same user-side data scale as Google, its market share only would have increased by 1 percent? A. . . [S]o the short answer is yes, that is a finding.").

F. Plaintiffs Have Not Proven That the Challenged Provisions Have Significantly Increased Barriers to Entry Relative to a But-For World.

58. Dr. Chipty stated that a goal of Plaintiffs' RPFJ is for "rivals to *overcome* the barriers to entry and expansion." Tr. 2173:1-12 (Chipty) (emphasis added).

59. But as discussed below, Plaintiffs offered no evidence of the extent to which the challenged contractual provisions materially increased any barriers to entry in the general search services market, as compared against Google paying for non-exclusive distribution. Tr. 2225:1-6, 2226:4-8, 2230:22-31:5, 2212:7-12 (Chipty); *see* Tr. 4201:21-02:8 (Murphy) (intervening to

overcome entry barriers that "would be there anyway" and were "not created by the conduct" "would be more akin to regulation that it would be a remedy").

60. And there is no evidence that, in a but-for world, any rivals would have completely overcome these barriers to entry. Tr. 4248:13-49:18 (Murphy).

61. The Court identified four barriers to entry in the general search services market: (i) distribution, (ii) scale, (iii) high capital costs, and (iv) brand recognition. Liability Op. at 157.

62. The Court's findings regarding these barriers were not predicated on challenged contractual provisions: "defendant's innocence or blameworthiness . . . has absolutely nothing to do with whether a condition constitutes a barrier to entry." Liability Op. at 154, 160.

63. In rebuttal, Dr. Chipty pointed to passages in the Court's opinion that she believes indicate that "Google's conduct exacerbated some of the barriers and it made others harder to overcome." Tr. 4602:18-03:20 (Chipty); PXRD030 at 3-4. But each of those passages referred to the effect of Google's distribution agreements *on the whole*, not their impact against a but-for world removing only *exclusive* distribution. PXRD030 at 4 (describing impact of "Google's distribution agreements" on each barrier to entry).

64. Plaintiffs' argument that each entry barrier was raised in a way that materially affected the competitive position of rivals is based on their argument that rivals' scale was materially less relative to the but-for world, for which Plaintiffs advanced no evidence. Tr. 4232:2-33:8 (Murphy) (claim that Google's conduct exacerbated entry barriers "basically derivative of the scale question"); RDXD-33.014; Tr. 4602:18-03:15 (Chipty) ("Brand is derivative of distribution of scale. . . . Google's conduct made it less attractive for rivals to incur the high capital costs of entry and expansion . . . if there's no path to market.").

65. There is no evidence that Google's conduct materially increased any of these natural entry barriers relative to a but-for world.

66. *First*, distribution is a barrier to entry that existed prior to the challenged conduct. For example, Bing has been the exclusive preloaded search engine on Windows for decades. Liability Op. FOF ¶ 26.

67. There is no evidence that the challenged contractual provisions materially increased any distribution entry barrier relative to the but-for world of non-exclusive distribution, or that any increase had a material impact on rivals' market positions or scale relative to the but-for world. *Supra* §§ I.C-E; Tr. 4232:2-36:2 (Murphy); RDXD-33.014.

68. The Court found that "Neeva was unable to gain a position as an *alternative default* GSE on any mobile device." Liability Op. at 237 (emphasis added). But this was not the result of Google's contracts; as the Court recognized, even under Google's agreement with Apple, many rivals, including DuckDuckGo, were set as "alternative default search option[s]." Liability Op. FOF ¶ 331; Tr. 2205:5-8 (Chipty) (agreeing that "nothing in Google's agreement prevented Apple from adding Neeva to the drop-down list for Safari").

69. To the extent there was any elevation of a distribution barrier to entry, this will be reduced going forward as Google's proposed remedies prohibit the types of provisions that the Court found exclusive. Tr. 4232:2-33:8 (Murphy) ("The distribution barrier . . . is directly addressed through the kind of corrective remedies. . . that directly address distribution going forward . . . ."""); RDXD-33.014.

70. *Second*, Plaintiffs claim that user-side scale is a natural barrier to entry in search. Tr. 2226:19-24 (Chipty).

71. Google's scale advantage existed long before the challenged conduct. Tr. 2227:1-10 (Chipty) ("[C]ertainly Google had a high market share, like, something like 80% beginning around 2014."); Liability Op. 1 ("In 2009, 80% of all search queries in the United States already went through Google").

72. The Court did not find, and there is no evidence, that rivals' user-side scale would have been materially different absent the challenged conduct. Tr. 4233:9-34:18 (Murphy) ("[T]here's no evidence that they would have gotten substantially more scale in the but-for world."); Tr. 2227:11-21, 2230:22-31:5 (Chipty) (agreeing she had "not provided a quantification" of the "specific impact Google's distribution agreements had on relative scale.").

73. Plaintiffs' claims were limited to exclusive dealing. Liability Op. at 203 (rejecting Plaintiffs' "dramatic post trial shift" to challenge "agreements blocking access to distribution" regardless of exclusivity). And as discussed above, Plaintiffs' experts now admit that Google could have paid for non-exclusive defaults in the but-for world. *Supra* § I.B.

74. Therefore, the size of Google's payments does not imply a lower scale entry barrier in the but-for world that still includes non-exclusive distribution. While the Court cited testimony that Google's "payments . . . freeze the ecosystem," Liability Op. at 201-02, and stated that the scale "barrier is reinforced by the size of Google's revenue share payments," *id.* at 233, the Court did not make any findings compared to a but-for world in which Google was paying for non-exclusive distribution. Tr. 4227:9-22 (Murphy) ("The magnitude of the payments doesn't isolate what was paid for the exclusive component" of Google's agreements or that there was "a substantial effect of exclusivity.").

75. *Third*, high capital costs are a natural barrier to entry in general search that existed before the challenged conduct. Liability Op. at 157-158; Tr. 2224:17-24 (Chipty).

76. There is no evidence how much lower or easier to overcome capital cost barriers would have been absent the challenged conduct, i.e., in a but-for world in which Google was paying for non-exclusive distribution. Tr. 4234:19-36:2 (Murphy); RDXD-33.014; Tr. 2225:1-4 (Chipty) ("Q. You've not tried to quantify what impact Google's distribution agreements have had on the capital costs of operating a search engine or search ads business, correct? A. No . . .").

77. *Fourth*, as for brand recognition, Google had an extremely strong brand long before any of the challenged conduct. Tr. 2225:20-26:3 (Chipty); Tr. 4226:1-18 (Murphy).

78. Brand recognition is a natural barrier to entry, and Plaintiffs' experts provided no opinion that any portion of Google's brand recognition was due to the challenged contract provisions. Liability Op. at 160 ("To be sure, Google's brand recognition is due in no small part to its product quality."); Tr. 2226:4-8 (Chipty); Tr. 1910:10-13 (Luca).

79. Because there is no evidence that Google's scale would have been materially different in the but-for world, there is no evidence that the brand barrier to entry would have been lower or easier to overcome. Indeed, Dr. Chipty agreed that the brand barrier derived entirely from scale. Tr. 4234:19-36:2 (Murphy); Tr. 4602:18-03:20 (Chipty).

II. PLAINTIFFS' PROPOSED PROHIBITIONS ON GOOGLE PAYING PARTNERS TO PROMOTE SEARCH WOULD HARM COMPETITION AND CONSUMERS.

80. Plaintiffs' RPFJ prohibits Google from offering revenue share or other compensation to partners, including browsers, OEMs, and carriers, to set Google Search as the default search provider, or for *any* preinstallation or placement. Pls.' RPFJ §§ IV.A-B.

81. Plaintiffs' proposed payment prohibitions also prohibit payments without any obligation on the third party to provide any particular promotion of Google at all ("unconditional revenue share"). Pls.' RPFJ §§ IV.A, E.

82. Plaintiffs' proposed prohibitions would harm, not help, search competition, would harm the competitiveness of Android against Apple, and would devastate independent browsers.

A. Plaintiffs' RPFJ Would Harm, Not Help, Search Competition.

1. Plaintiffs' Restrictions on Google Competing for Distribution Would Harm Competition and Result in Lower Payments to Partners.

83. Search engines compete for distribution on quality and price. Tr. 4241:23-43:16 (Murphy); RDXD-33.020; Liability Tr. 9703:2-07:1 (Murphy); Liability Op. FOF ¶ 327 (describing Apple's consideration of Microsoft's monetization and quality).

84. Google offers superior search quality and monetizes better than competitors. Liability Op. FOF ¶ 126; Liability Op. at 199-200; *see supra* § I.C.

85. The Court found that "[t]he most efficient channel of GSE distribution is, by far, placement as the preloaded, out-of-the-box default GSE." Liability Op. at 24. Nevertheless, under Plaintiffs' RPFJ, only Google's rivals, and not Google, would be able to offer revenue share or other payment for default search status or preinstallation. Tr. 4243:17-44:20 (Murphy).

86. Plaintiffs' proposal would force partners to choose between two suboptimal choices: continuing to promote Google Search, while receiving no revenue,[4] or, alternatively, entering into arrangements with different search providers under which their users would get lower quality results, and they would receive less revenue than under their current agreements with Google. Tr. 4250:2-17 (Murphy) (describing partners' "Hobson's choice"); RDXD-33.023; Tr. 3825:7-30:10 (Cue) ("I find it difficult to understand the concept of us not being compensated for the services that we've rendered." "[M]ost customers would pick Google

[4] Plaintiffs' responses to Google's interrogatories suggest that even this may not be allowed. RDX0705* at .007-008 (stating that under Plaintiffs' RPFJ, Google would not be permitted to condition "a free license to a third party in return for preinstallation of Google Search, Google Chrome, or Google Gemini Assistant Application on a device (a) in a place to be determined by the third party, or (b) in a place designated by Google.").

because it is the best search engine . . . . [I]t would certainly be a bad thing for Apple to make a choice of not providing customers what the best choice is."); Tr. 2288:6-22 (Chipty) ("[I]t's reasonable to expect that there will be some hit to manufacturers.").

87. The first bad choice—continuing to distribute Google without payment—would not accomplish Plaintiffs' remedial objective of shifting share to rivals (Google would continue to be distributed as before), but partners would be harmed by the payment reduction, as explained below (*infra* §§ II.B-C). Tr. 4250:18-51:25 (Murphy); RDXD-33.024-.027.

88. The second bad choice—preloading an inferior search engine—harms users by foisting on them an inferior product, while also leading to lower revenue as a result of reduced competitors' incentives to offer favorable revenue terms. Tr. 4253:18-54:5 (Murphy) (partners can "expect to see lower payments to partners" as a result of taking "the highest valued customer for your promotion off the table"); RDXD-33.028; Tr. 2287:11-88:5 (Chipty) ("[P]ayments, however they're structured, will be a function of the strength of the second-best competitor . . . . And I think that until rivals would have a chance to significantly improve their product quality, it is quite possible that in the remedial world, payments will be lower. And in the initial years.").

89. According to Microsoft's CEO, if one of the two major search providers were unable to compete for distribution, that would limit competition. Liability Op. FOF ¶ 329 ("Microsoft CEO Satya Nadella testified that if, hypothetically, Bing exited the market, there would be a real concern as to whether Google would even pay Apple for default status, given the lack of any other option at all" (citing Liability Tr. 3505:12-17 (Nadella))).

90. And the third largest GSE in the United States, Yahoo, is prohibited by agreement with Microsoft, until December 21, 2030, from competing against Microsoft for certain new search agreements without Microsoft's consent, including "[redacted] Implementations"

such as setting Yahoo as the default on [redacted]. RDX0083* at .006 (Microsoft deal review: "Key Terms (Search) . . . Yahoo's ability to offer search for [redacted] scenarios (syndication and [redacted]) terminates for new partners. Yahoo may continue to offer [redacted] to existing partners (as of 12/1/2022)."), .007 ([redacted]); PXR0081* at -274 (Yahoo document evaluating "partnering with[] Opera": "this partnership would have to be approved by Microsoft"); RDX0511 at .003 ("Yahoo will not grant rights to deploy [redacted] Implementations."); RDX0513 at .006-.008 (listing current [redacted] arrangements Yahoo may continue under the agreement, including "Yahoo default [redacted]" for certain partners).[5]

91. Under the Yahoo-Microsoft agreement, if a new partner approaches Yahoo seeking rights to new [redacted] implementations (which includes "Yahoo default [redacted]"), Yahoo must "direct such third party to Microsoft." RDX0511 at .004-005; *see also* RDX0513 at .006.

92. Partners are concerned that the remaining options for search will not offer favorable terms if Google is barred from competing, and that they will suffer as a result.

93. Samsung expects that other companies would not be "willing to pay as much" or "negotiate with [Samsung]" if Google were prohibited from paying for promotion. Kim (Samsung) Dep. Tr. 46:17-47:1; *see also id.* 44:20-45:17.

[5] Brian Provost from Yahoo testified that Yahoo could still do some "preload distribution" agreements despite this amendment, but he spoke only in general terms (given the open court setting). Tr. 1275:18-76:22 (Provost). As the contract documents make clear, however, Yahoo is in fact limited in what agreements it can enter into without Microsoft's consent.

94. Motorola testified to similar concerns. Laflamme (Motorola) Dep. Tr. 82:13-84:14 ("If you were to remove those payments [from Google], it essentially removes the baseline of what others would need to pay to leverage an OEM like us as a channel for their services. So we would have options. My strong belief is the value that would come to us would decline quite significantly."); Laflamme (Motorola) Dep. Tr. 84:15-85:5 ("I'm basing that based on discussions we've had with other players and their willingness to provide funding for services that they're putting on our devices, and those amounts are generally much less than what we receive from Google. . .").

95. Motorola expects to suffer "significant financial burdens on [its] business," were Google prohibited from paying for promotion. [redacted] Laflamme (Motorola) Dep. Tr. 77:6-78:19.

96. T-Mobile expressed similar concerns, including significant impacts on the Android ecosystem. Giard (T-Mobile) Dep. Tr. 115:25-16:10 ("[T]he way I understand it, those restrictions would prevent Google from entering into agreements similar to what we have with the Android Activation Agreement, which we -- the revenues from which we use to help prop up the Android ecosystem through subsidies, through advertising, through promotion, through creating better experiences, through offering diverse services, et cetera.").

97. Mozilla expects that Microsoft would pay it a lower revenue share than it does today, due to the "lack of viable alternatives." RDX0340 at .002; Tr. 3144:10-15 (Muhlheim) ("Q. Do you have any reason to believe that the percentage might be lower if Google could not pay Mozilla a revenue share? A. I'm concerned that -- based on the past experience we have had with Microsoft as a partner, that that is something that would be on their mind.").

98. Opera, another independent browser, expects it may be unable to negotiate an agreement with another company that provides it significant revenue share. Standal (Opera) Dep. Tr. 54:2-19 ("[redacted]").

99. Apart from reducing the incentives of rivals, Plaintiffs' RPFJ would further disadvantage partners because they would be unable to receive revenue for the usage of Google on their browsers or devices, when many users inevitably change their default search engine to Google. Tr. 3140:15-42:13 (Muhlheim) ("The first [statistic, '% DAU with Search set to Default'], it looks at what percentage of [users] would maintain Bing as their default versus switching to some alternative search engine, in many cases, Google, for which, under these remedies, we would not get paid." (testifying about RDX0340 at .005)); Laflamme (Motorola) Dep. Tr. 87:6-89:2 (because using Google "ultimately is . . . the consumer's choice," loss of revenue from choice screens in Europe "has been very negative"); Tr. 3825:7-29:2 (Cue) ("[M]ost customers would pick Google because it is the best search engine" by "typ[ing] in Google.com and search[ing]" or "using an extension" to put Google as the default, but Apple would "no longer get compensated for the services that [it is] rendering"); Ezell (AT&T) Liability Dep. Tr. 301:18-02:17 (agreeing that if AT&T set a different default search engine on Android handsets, "consumers would simply go around it and download Google Search").

100. Partners are also concerned that offering a rival search engine instead of Google will cause users to stop using their products altogether. Standal (Opera) Dep. Tr. 32:11-24

("Testing showed . . . Opera experienced degraded user retention (as an example more users abandoned Opera if Bing was primar[y] search default versus if Google was primary search default)." (testifying about RDX0360 at .001)); Tr. 3146:4-47:9 (Muhlheim) (noting that when Mozilla switched the default to Yahoo, "people started shifting away from the browser" and Mozilla "found that the most important time to retain a user is the first time that they use the browser. If they have a really bad experience with their first search, that's one of the things that's going to cause them to move to some other kind of browser."); Tr. 3154:4-25 (Muhlheim) ("And a lot of the possible draining of users that we saw during the Yahoo! experience would be happening during that time [if Plaintiffs' proposed final judgment is entered] because people would not be finding an optimal search experience there.").

101. As explained below, Plaintiffs' proposed syndication and data sharing proposals would not mitigate this harm but instead would introduce further distortions to the competitive process that undermine innovation. *Infra* § V; Tr. 4254:18-55:21 (Murphy); RDXD-33.029.

2. Plaintiffs' Payment Prohibitions Would Harm Users.

102. Beyond the harm to search competition, Plaintiffs' payment prohibitions would also directly reduce consumer welfare by shifting users to lesser-quality search engines.

103. Browsers and devices that offer the highest-quality search engine provide the best user experience. Liability Op. at 253 ("The court accepts that the user experience of a browser is enhanced when the default GSE is excellent.").

104. Plaintiffs' goal in prohibiting Google from offering payment for preinstallation, placement, or other promotion of Google Search is to shift user share to rivals. Tr. 2140:18-41:15 (Chipty) (claiming the payment bans would "likely cause many distributors to shift their defaults away from Google, because, again, rivals could pay for defaults but Google couldn't"), Tr. 2179:19- 80:19 (Chipty) (arguing that Google's proposed remedies are "ineffective" because

they "allow Google to pay for defaults," which is a "problem in getting rivals the ability to access users").

105. Dr. Chipty estimates that Plaintiffs' payment prohibition could shift 31% of Google's share to rivals if partners switch away from Google. Tr. 2139:14-40:6 (Chipty); PXRD012 at 19.

106. Accordingly, almost a third of users, under this scenario, would no longer be using the highest-quality, most-preferred search provider. Liability Op. FOF ¶ 126 ("Google is widely recognized as the best GSE available in the United States."); Tr. 2309:12-22 (Chipty) (agreeing Google "has the best product"), Tr. 2307:20-25 (Chipty) ("unfortunately, we're in the world of the second best").

107. Thus, Plaintiffs' proposed payment prohibition could result in massive consumer harm. Tr. 4252:21-53:17 (Murphy) (testifying that, based on the Allcott study, Plaintiffs' payment bans could result in billions in consumer harm); RDXD-33.028.

3. Plaintiffs' Alternative Proposed Methods of Promotion of Google Search Would Not Avoid the Harms to Competition.

108. Plaintiffs suggest that Google would still be able to compete for users through (i) other promotion of the Google Search Application (the "GSA") and (ii) direct payments to users. Neither of these alternatives avoids the harm to competition caused by Plaintiffs' proposed prohibition on payment for promotion. Tr. 2158:3-20 (Chipty); PXRD012 at 27.

109. *First*, Plaintiffs suggest that Google could compete by distributing the GSA through app stores and promoting it through Google's other web properties. PXRD012 at 27; Tr. 2158:3-20 (Chipty); Tr. 4244:21-45:1 (Murphy).

110. Plaintiffs' position is inconsistent with the position they took, and which the Court adopted, in the liability phase (i.e., that user-initiated downloads of search applications are

not an effective method of distribution). *See* Liability Op. FOF ¶¶ 77-79; Tr. 4244:21-46:1 (Murphy) (advertising through the app store "doesn't really offset all of the things that are lost by getting rid of the three most effective and empirically valid ways of competing"); RDXD-33.020.

111. *Second*, Plaintiffs suggest that Google could make direct payments or give rewards to consumers for using Google Search. *See* Tr. 2159:16-60:9 (Chipty); PXRD012 at 27.

112. But direct payments or rewards incentivize conduct such as fraudulent queries. Tr. 4244:21-46:1 (Murphy); RDXD-33.020 (citing Professor Whinston).

113. Microsoft's Bing Rewards program did not succeed in causing users to switch to Bing. *See* Tr. 4244:21-46:1 (Murphy) ("[W]e do see some things like Bing rewards, but they tend to be quite small because making them big would tend to attract the kind of fraud problems that are there."); RDXD-33.020; RDX0319* at .005-.006 (as Bing Rewards "[redacted]," requiring "[redacted]

114. Dr. Chipty also asserted that Google could compete by innovating. But Plaintiffs' proposal robs Google of incentives to innovate. Tr. 4243:17-44:20, 4246:2-8 (Murphy).

4. There Is No Evidence That Plaintiffs' Proposals Would Change Apple's Behavior in a Way That Would Promote Search Competition.

115. Apple has consistently chosen Google for its superior quality. Liability Tr. (Cue) 2584:12-86:6 ("Google still has the best search engine by far[.]"); Tr. 3825:7-29:2 (Cue).

116. Apple and Google have worked collaboratively to improve the Google Search experience on Safari to benefit Apple's users. Tr. 3820:22-21:18 (Cue).

117. Plaintiffs' RPFJ would impose on Apple the same difficult choice all third-party partners would face: either set a lower-quality search provider as the default search engine on

Safari or continue to offer the highest-quality search engine to its users but without payment for that distribution. Tr. 3825:7-30:10 (Cue).

118. Apple has not decided as to which of those two inferior choices it would make. Tr. 3829:3-30:10 (Cue) ("I've lost a lot of sleep thinking about [what Apple would do if the Court imposed a payment ban]. Because ultimately, we want to do what's best for the customer. That is our number one priority. . . . I don't see any change that we can do that would satisfy our customers. That's the fundamental issue with this.").

119. Apple has been clear, however, that Plaintiffs' proposals would not lead it to build its own GSE. Apple has consistently determined that doing so would require it to "forgo investment in other areas of product development." Liability Op. FOF ¶ 302; Tr. 3825:7-29:2 (Cue) ("We can't do everything so we have to choose the things that we do . . . that's not the competency we had, and we chose to do other things.").

120. Apple's recent partnership choices underscore its consistent strategy of choosing high-quality partners to provide services to Apple customers. Tr. 3825:7-29:2, 3836:15-37:11 (Cue) ("We've done this already with OpenAI. . . . This gets back to my point about, we just can't do everything so we have to pick the areas that we think we can be better at and are unique at, and that's where we want to spend our energy and our resources.").

121. Even if Apple were to enter into an agreement with Microsoft to set Bing as the default search engine, payments from Microsoft under that agreement would likewise disincentivize Apple from entering the search market. Tr. 4261:12-62:4 (Murphy).

B. Plaintiffs' RPFJ Would Undermine the Competitiveness of Android and Harm Users of Android Devices.

1. Restricting Google's Ability to Provide Revenue Share to OEM and Carrier Partners Would Harm Mobile Device Competition.

122. Android has struggled in the mobile device competition against Apple. Tr. 2470:4-71:22 (Pichai); Boulben (Verizon) Dep. Tr. 71:23-72:6 ("Android has slipped further. As I said, in Q4, speaking for Verizon, we were [redacted] percent IOS in our sales." (testifying about RDX0374 at .002)); Kim (Samsung) Dep. Tr. 19:23-20:12 ("[The] market is very skewed to iOS, especially in U.S."); Giard (T-Mobile) Dep. Tr. 15:16-25; Ezell (AT&T) Liability Dep. Tr. 175:7-76:24; RDX0098* at .013-.014.

123. Over the past several years, Android's share of active mobile devices has declined. Boulben (Verizon) Dep. Tr. 25:9-17 ("[S]ince 2019, at least, the Android ecosystem has been losing market share consistently."); Kim (Samsung) Dep. Tr. 27:17-28:6 (explaining that Samsung's "position is weakening" against Apple in the U.S.).

124. Google's revenue share payments facilitate promotion of Android in competition against Apple. Tr. 3893:4-94:22, 3896:4-97:2 (Samat (Google)).

125. Revenue share payments encourage OEM partners to promote Android and develop high-quality devices. Tr. 3893:4-94:22 (Samat) ("The revenue that we share with [OEMs] is a vital part of what helps them build their business and deliver products to the market. They use those dollars for R&D, they use those dollars for marketing, they use those dollars to innovate, and I think Android has been [a] big [] part of how innovation in the mobile space has worked."); Kim (Samsung) Dep. Tr. 42:16-43:22 (revenue share payments help Samsung "to innovate and provide . . . the latest technology and better services to our customer[s]"); Christensen (Motorola) Liability Dep. Tr. 70:22-71:3.

126. Likewise, revenue share payments incentivize carriers to promote Android devices over Apple, including by offering lower-priced Android devices to consumers. *See* Tr. 3896:4-97:2 (Samat) ("The revenues that are shared by Google with these carriers help support the price, promotion, and placement activities that carriers do on the Android portfolio."); Liability Tr. 1097:1-17 (Higgins) ("[W]e have reached terms that allow [Verizon] to invest in the Android ecosystem and, as such, a healthy mix of OSs within the U.S."); Boulben (Verizon) Dep. Tr. 44:3-8, 69:3-70:13, 118:11-19:4 (Verizon uses revenue share "to help and fund the promotion of devices and offset" subsidies); Ezell (AT&T) Liability Dep. Tr. 173:10-74:8 (AT&T's RSA with Google "specifically created incentives for AT&T to increase our number of Android active devices on the network"); Liability Tr. 9351:8-52:6 (McCallister).

127. Therefore, the Android platform would be harmed if OEMs and carriers were no longer able to receive revenue share payments from Google.

128. For OEMs, precluding Google from making revenue share payments would reduce their ability to invest in high-quality devices and increase the cost of Android devices. Tr. 3893:4-94:22 (Samat); Liability Tr. 9876:6-77:9 (Murphy); Kim (Samsung) Dep. Tr. 44:9-19 ("[S]ome of the product could end up increasing prices or defeature our product to manage the profit, which will make our position very weaker in the market and especially in U.S. Then it will be -- we'll be structurally disadvantaged against Apple and, you know, it will be a purely 100 percent Apple market eventually."); Kim (Samsung) Dep. Tr. 236:2-5, 236:8-18 (highlighting "new foldables, . . . thinner hardware, and all the investment that we're making to bring the latest technology to the device" among initiatives that Samsung would need to reconsider if it received less payment from Google).

129. Precluding Google from offering revenue share could force OEMs to [redacted], harming innovation. *See, e.g.*, [redacted]; Tr. 3893:4-95:19 (Samat) ("Without that, those revenue streams, I think I would see many of [the OEMs] exit the space, certainly many of them would exit segments of the space that they could no longer afford to make profitable."); RDXD-30.006 (nearly 500 brands around the world exited the smartphone business between 2017 and 2023).

130. For carriers, precluding Google from making revenue share payments would decrease their incentive and ability to promote Android over Apple. Tr. 3896:4-97:2 (Samat) ("Without those, I think that the carriers would certainly have less Android in their portfolio. As a result, they would sell less Android, they would sell more iPhones."); Boulben (Verizon) Dep. Tr. 26:5-23, 44:3-8, 69:24-70:13; Ezell (AT&T) Dep. Tr. 127:13-28:1.

2. Removing Google Services from Android Devices Would Harm Mobile Device Competition.

131. Preloading Google Search, which is the most preferred search engine, provides a compelling out-of-the-box experience for Android users. Liability Tr. 7654:15-55:8 (Pichai); Liability Tr. 9434:16-35:5 (Rosenberg (Google)); Liability Tr. 1105:24-06:10 (Higgins).

132. Consumers expect Google services to be preloaded on Android devices. Boulben (Verizon) Dep. Tr. 39:11-19 ("[C]ustomer[s] expect to have the Google experience on Android devices."); Liability Tr. 946:13-23, 977:4-16 (Kolotouros (Google)).

133. Preloading a full suite of Google's services, including Google Search and Chrome, is one of the ways Android devices are differentiated from Apple devices. RDX0374 at .002 (Verizon document discussing ways to differentiate Android devices from Apple devices by prioritizing "the best experience of Google services" on Android); Liability Tr. 7656:2-9 (Pichai)

("[Consumers] realize it's an operating system from Google, and . . . this differentiates Android from iPhones, and helps the OEM compete better with iPhones.").

134. If Google is prohibited from paying for any promotion of Google Search, carriers and OEMs may be forced to preload lesser-quality rivals to partially make up the revenue shortfall. This would harm Android users, which would further undermine Android devices in its competition with Apple. Boulben (Verizon) Dep. Tr. 39:11-19; Kim (Samsung) Dep. Tr. 31:1132:5-32:18 (recognizing Bing as the only other alternative search provider Samsung would consider and that "people find Google Search more reliable or a better product" than Bing).

135. Past experiences preloading rivals have been failures for Android partners.

136. In 2010, Motorola and AT&T launched the Backflip, an Android phone preloaded exclusively with Yahoo as the default search engine. Preloading Yahoo on the Backflip device instead of Google resulted in AT&T receiving "complaints by customers" and criticism in the media. Ezell (AT&T) Liability Dep. Tr. 287:21-88:22.

137. Likewise, in 2010, Samsung and Verizon launched the Fascinate, an Android phone preloaded exclusively with Bing as the default. The Fascinate device was a commercial failure because Bing was preloaded as the default. Liability Tr. 3566:15-68:22 (Nadella) (testifying that Microsoft "saw a lot of" bad press surrounding the Samsung Fascinate); DX0737 at .001 (Verizon "took a bit of a hit in the news coverage of the Samsung Fascinate because the phone uses Bing as a default search engine rather than Google").

3. Plaintiffs' Proposals Would Result in Higher Priced, Less Competitive Android Devices.

138. As discussed above, Plaintiffs' proposed payment prohibitions would reduce overall payments to OEMs and carriers.

139. Google's search revenue share payments are passed on directly to consumers in the form of lower device prices. Tr. 4253:24-54:5 (Murphy); Tr. 2288:23-89:5 (Chipty); Tr. 3897:3-98:7 (Samat).

140. Search revenue share from Google allows OEMs, such as Samsung, and carriers, such as AT&T and Verizon, to subsidize the end user price of its smartphones. Kim (Samsung) Dep. Tr. 213:19-14:23 ("[A]ll the, sort of, revenue that we get from Google is supporting to actually have a wider range of price points[.]"); Ezell (AT&T) Dep. Tr. 127:13-28:1; Boulben (Verizon) Dep. Tr. 120:11-23 (Verizon uses RSA payments "to improve, more broadly, Verizon's competitive offerings for Android devices, whether it's the price of the devices, whether it's buy-one-get-one-free Androids, . . . all these things that consumers look at when they're trying to make a choice amongst competitive offerings"); Giard (T-Mobile) Liability Dep. Tr. 277:15-78:3 (RSA payments to T-Mobile "helped support some . . . reduction in direct cost to consumers"); Liability Tr. 9855:6-56:1 (Murphy).

141. Thus, at least "in the short run," "lower payments in the remedial world will translate into potential harm to consumers" in the form of higher-priced, lower-quality Android devices. Tr. 2288:23-89:5 (Chipty); Tr. 4253:24-54:5 (Murphy); Tr. 3897:3-98:7, 3893:4-94:22 (Samat); Kim (Samsung) Dep. Tr. 44:9-45:17.

142. That Plaintiffs' proposals would harm competition, partners, and users is illustrated by contrasting the payment bans Plaintiffs propose with payments permitted in Europe following the European Commission's Android decision in July 2018.

143. Including Google Search as part of the MADA allows zero-cost licenses to OEMs for a high-quality set of applications. Liability Tr. 9849:17-51:1 (Murphy).

144. In Europe, following the EC's decision, Google "unbundled" the Google Search Widget, Google Search App, and Chrome browser from the rest of the MADA (relabeled the "EMADA"). Liability Tr. 9866:3-68:6 (Murphy); Liability Tr. 9443:3-45:20 (Rosenberg).

145. As a result, Google charged OEMs a license fee for each EU device that preloaded the suite of Google applications in the EMADA. Liability Tr. 9866:3-68:6 (Murphy); DXD-37.110; Liability Tr. 9443:15-44:2 (Rosenberg).

146. Google then offered to pay OEMs a royalty-free license to Google Search and Chrome, with a placement bounty for preloading Google Search and Chrome. Liability Tr. 9866:3-68:6 (Murphy); DXD-37.110; Liability Tr. 9444:3-45:13 (Rosenberg).

147. Without Google Search included as part of the MADA in the United States, Google may need to charge a license fee to partners. Kim (Samsung) Dep. Tr. 51:20-52:10 (explaining that the license fee structure in Europe "became a very strong burden" for Samsung); Laflamme (Motorola) Dep. Tr. 87:12-89:2.

148. If Google is prohibited from paying for promotion, OEMs would not be able to enter into promotional deals with Google to help offset such license fees, as they did in Europe. This would increase the cost of manufacturing phones and result in higher-priced and/or lower-quality devices. Liability Tr. 9876:6-77:2 (Murphy).

149. Google's proposals would also unbundle Search from other MADA apps. Google's PFJ § III. But unlike under Plaintiffs' proposal, Google could continue to pay bounties for placement, as it does in Europe. Thus, permitting Google to pay for promotion would allow OEMs to offset some or all of any license fees necessitated by unbundling the MADA.

4. Google's Recent Android Agreements Have Given Partners Increased Flexibility Consistent with Google's Proposed Remedy.

150. Since the Court's liability ruling, Google has agreed to additional flexibility to its Android agreements, consistent with Google's proposed final judgement.

151. Effective April 1, 2025, Google and Samsung entered into a new U.S. RSA, lasting six months, which provides additional flexibility to Samsung. PXR0608 (Google Mobile Revenue Share Agreement); Tr. 239:12-20 (Fitzgerald); RDXD-02.002.

152. The current U.S. RSA provides Samsung the flexibility to choose, on a "device by device" basis, which access points are set to Google Search. Tr. 347:20-48:11 (Fitzgerald); PXR0608 at -062 (Attach. A, § 2). Samsung has no obligation to place the Google Search Widget or Chrome on devices for which it may receive payments. Tr. 354:8-14 (Fitzgerald).

153. The current U.S. RSA with Samsung is expressly non-exclusive; the non-exclusivity requirement extends to alternatives to any Google application, including third-party search, vertical search and on-device search services as well as alternatives to the Gemini App such as ChatGPT, Perplexity, and CoPilot, among other services. PXR0608 at -049 (§ 9.1); Tr. 349:6-9 (Fitzgerald) ("no requirements to exclusively promote any Google service").

154. Additionally, under the Gemini Commercial Agreement between Google and Samsung presently in effect, alternative GenAI services are permitted across all agreements between Google and Samsung, including the RSA. RDX0432 at .009 (§ 4.7); Kim (Samsung) Dep. Tr. 70:14-71:17 (explaining that under § 4.7, "Samsung has a[n] . . . option to work with any other generative AI companies for our devices . . . [and] freedom to do so").

155. Effective January 1, 2025, Google and Motorola entered into Amendment 10 to the Google Mobile Incentive Agreement (the "MIA" or the "RSA"), lasting nine months for U.S. Premier Tier Devices and 12 months for global Foundation Tier Devices, which provides

additional flexibility to Motorola. RDX0442 at .001-.006; *see also* PXR0607 at -037-038 (setting no restrictions on alternative assistive services and waiving Assistant requirements).

156. Under the current MIA, Motorola has the flexibility to choose, on a device-by-device and access-point-by-access-point basis, whether to preload Google services. RDX0442 at .005 (§§ 2.17, 2.18); Tr. 355:18-56:3 (Fitzgerald); Laflamme (Motorola) Dep. Tr. 57:1-58:4 (describing additional flexibility for Motorola under the amended MIA).

157. Under the current MIA, Motorola can preload "any alternative search provider or alternative assistive service provider or GenAI service, like ChatGPT, CoPilot, Perplexity" and still receive payments from Google. Tr. 356:7-24 (Fitzgerald); RDX0442 at .002 (§ 2.3).

158. Under the current MIA, Motorola is not obligated to place the Google Search Widget and Chrome Browser on the Default Home Screen. RDX0442 at .003 (§§ 2.9, 2.10); Tr. 355:18-56:3 (Fitzgerald). If Motorola elects not to preload the Google Search Widget on the Default Home Screen, it would forfeit only a trivial amount per month. RDX0442 at .005 (§ 2.18); Laflamme (Motorola) Dep. Tr. 164:13-66:11 (Motorola would lose only $145,000 per month if it did not load the Google Search Widget on its devices).

159. Google has also entered into revised agreements with Verizon and AT&T, and proposed a revised agreement with T-Mobile, which provide additional flexibility to these carriers. RDX0440 (Verizon) (§§ 2.1, 2.4, 2.5, 2.9, Attach. B); RDX0438 (AT&T) (§§ 2.5, 2.8, Attach. B); Tr. 359:7-20, 360:20-61:7, 362:8-24, (Fitzgerald). RDXD-02.004 (Verizon); RDXD-02.005 (AT&T); RDXD-02.006 (T-Mobile).

160. Under these agreements and proposals, the carriers have the flexibility to choose, on a device-by-device, access-point-by-access-point basis whether to promote Google Search.

Tr. 359:14-60:18, 361:1-7, 362:14-21 (Fitzgerald); RDX0440 at .002 (§§ 2.4, 2.5); PXR0609 at -073-074; RDX0438 at .001-.002, .005-.007 (§ 2.5, 2.8, Attach. B); PXR0606* at -035-036.

161. And the agreements and proposals expressly permit non-Google alternative search services and non-Gemini GenAI services and assistants to be preloaded on a device. Tr. 360:4-7, 361:9-21, 363:1-5 (Fitzgerald); RDX0440 at .003 (§ 2.9); PXR0609 at -073-074; RDX0438 at .002 (§ 2.8); PXR0606* at -035-036.

C. Plaintiffs' RPFJ Would Harm Users of Apple Devices and Devastate Independent Browsers.

1. Apple Users Would Be Harmed Under Plaintiffs' RPFJ.

162. Apple believes Google Search provides the best search experience for its customers. Liability Op. FOF ¶ 302 (noting that were Apple to stop partnering with Google it would "undertake the risk of consumer backlash"); Tr. 3818:13-19:4, 3829:3-30:10 (Cue) ("So we have to pick what's best for our customers, and today, that is still Google.")

163. Apple offering distribution of Google Search without getting paid for its services is highly troubling to Apple. Tr. 3825:7-29:2 (Cue) ("Lastly, it seems, if the Court has found that Google has done something wrong here, that somehow the result of that is that we no longer get compensated for the services that we're rendering and Google gets to keep all of the money, that just seems crazy to me."); Tr. 3829:3-30:10 (Cue).

164. Were Google prohibited from paying Apple for distribution, Apple would be limited in its ability to innovate in the future, as the reduced revenue would impact the amount it could invest in engineers and new products, including its advancements in Apple Intelligence. Tr. 3830:19-32:2 (Cue) (RSA funds have "an impact in [Apple's] ability at creating new products and new capabilities into the OS itself," and the revenue would "certainly" "have an impact on Apple's business operations" including "the people it employs"), Tr. 3833:12-22

(Cue) ("Apple Intelligence [is] an example of a type of innovation that could be impacted by a loss of revenue share from the Google agreement," as Apple has "thousands of people working on that").

165. Apple and Google recently collaborated to integrate Google Lens, a feature that allows users to search based on images, into Apple products. But under Plaintiffs' RPFJ, Apple would also be prevented from receiving payment in exchange for innovative new search features, like Google Lens, that benefit Apple users. Tr. 3823:11-25:2, 3830:13-16 (Cue).

2. Plaintiffs' RPFJ Would Harm Users of Independent Browsers and Threaten Their Businesses.

166. Mozilla Corporation offers the Firefox web browser and is a wholly-owned subsidiary of the Mozilla Foundation, a non-profit that advocates for an open web, privacy, and consumer choice. Tr. 3128:22-29:1 (Muhlheim).

167. Opera is a software company that offers web browsers, and has roughly 300 million monthly users. Standal (Opera) Dep. Tr. 10:7-13, 18:10-16.

168. Both Mozilla and Opera choose to set Google as the default search provider because it is "the search product and services that [its] experience shows are the highest quality." RDX0338* at .001; Tr. 3131:1-6 (Muhlheim); Baker (Mozilla) Liability Dep. Tr. 100:3-18; Standal (Opera) Dep. Tr. 31:2-20.

169. Independent browsers like Mozilla and Opera understand that without offering Google Search to their users out of the box, they jeopardize their ability to retain users and market share. Standal (Opera) Dep. Tr. 54:20-55:16 ("This would lead to similar reduced retention numbers, as we see in the case of the Bing distribution."); RDX0338* at .001 ("We believe that Mozilla cannot effectively compete with other browser developers without the continued integration of the industry leading search product and services.").

170. Preventing Mozilla and Opera from receiving payment from Google and forcing them to ship their browsers with a search engine other than Google would reduce the amount they could invest in their browsers, leading to further user drop-off and revenue shortfalls, and potentially putting them "out of business" or preventing them from operating in the United States. Tr. 3134:20-35:19 (Muhlheim) ("And then in decreasing the amount of investment . . . we believe would make Firefox itself much less competitive and potentially start a downward spiral of usage as people defected from our browser, which, you know, could at the end of the day put Firefox out of business."); Standal (Opera) Dep. Tr. 54:2-55:16 (Plaintiffs' payment ban would make it [redacted] and "hard for [Opera] to continue to invest in innovative solutions that we provide for the US audience."); Liability Op. FOF ¶ 335 ("Mozilla has repeatedly made clear that without these payments, it would not be able to function as it does today.").

171. Losing Firefox and Opera as competitors would have significant harms to competition, innovation, and stability in the browser market, as it would remove competitive pressure on large browsers and threaten the existence of Gecko, the only web engine not backed by a large technology company. Tr. 3132:19-33:20 (Muhlheim); Baker (Mozilla) Liability Dep. Tr. 94:15-19, 95:1-22, 96:10-98:3; DX0547 at .001 ("[I]t would be likely that Mozilla Corporation would exit the browser market in that circumstance altogether, and it is extremely likely that Mozilla Corporation would no longer be able to sustain an independent browser engine given the expense.").

172. About 80-85% of Mozilla's annual revenue comes from its search partnership with Google. Tr. 3131:7-34:2 (Muhlheim); Liability Op. FOF ¶ 335.

173. Although Mozilla has considered ways to diversify revenue streams, it has concerns about certain revenue sources, like advertising, that may conflict with core Mozilla privacy principles that differentiate Firefox from other browsers. Tr. 3174:14-75:3 (Muhlheim).

174. Forty percent of Opera's revenue comes from agreements with search providers, of which Google provides the largest proportion. Standal (Opera) Dep. Tr. 19:19-20:7, 21:4-24.

175. Both Mozilla and Opera use the revenue they earn from their search partnerships with Google to invest in product development, including to support the various AI integrations they have introduced in their browsers. Standal (Opera) Dep. Tr. 41:25-42:8, 47:17-48:2, 54:20-55:16 ("[I]f Google could no longer pay to be the default search engine in Opera's browsers in the US . . . it would make it hard for us to continue to invest in innovative solutions that we might provide for the US audience."); Tr. 3131:7-32:18, 3157:16-58:13 (Muhlheim); Baker (Mozilla) Liability Dep. Tr. 45:15-17, 45:19-21.

176. Mozilla also uses the funds it receives from Google to maintain its Gecko browser engine, and to fund the work of the Mozilla Foundation. Tr. 3131:7-33:20 (Muhlheim); RDX0338* at .001.

177. Both Opera and Mozilla have conducted analyses of user switch rates from Bing to Google should they be forced to ship their browsers with Bing as the default.

178. Opera's testing in late 2024 showed that three-quarters of users who had Bing set as their default search provider "change[d] their default search provider to Google." This analysis concluded that "Opera experienced degraded user retention (as an example more users abandoned Opera if Bing was primarily search default versus if Google was primarily search default)." Standal (Opera) Dep. Tr. 32:11-24 (testifying about RDX0360 at .001).

179. In late 2024, Mozilla assessed the likely impact of Plaintiffs' proposed payment prohibition—assuming Mozilla would enter into a default search agreement with Microsoft's Bing—using the results of "Project Waldo," an experiment on the impact of switching users' default search engines to Bing that Mozilla conducted in 2020. RDX0340 at .002; Tr. 3137:19-40:14 (Muhlheim) (describing Project Waldo and RDX0340, the Redwood Analyses).

180. These results were consistent with Mozilla's real-world experience in 2014-2017, when it switched the default to Yahoo and experienced significant user retention drop-off and user switching to Google. RDX0340 at .009; Tr. 3145:22-47:9 (Muhlheim); Baker (Mozilla) Liability Dep. Tr. 76:5-23 (Mozilla "found our users trying all sorts of different ways to get back to Google and we experienced lots of people leaving Firefox").

181. The 2024 analysis concluded that Mozilla would lose over [redacted] over the first three years following a switch to Bing. RDX0340 at .004-.005; Tr. 3145:1-21 (Muhlheim).

182. In Mozilla's recent discussions with Microsoft regarding setting Bing as the default search provider, Microsoft has [redacted], leading Mozilla to conclude that Microsoft would [redacted] were Google prohibited from paying Mozilla for placement on Firefox. Tr. 3144:5-9, 3137:2-6 (Muhlheim) ("[T]here is a revenue share that we get from Microsoft, and if there is no alternative party to bid for that traffic, we assume that that revenue share would start to decrease over time."); RDX0340 at .004 (modeling Bing revenue share at existing [redacted] and noting "[d]oes not capture likely change in revenue share due to lack of other viable options so revenue impact likely greater").

183. Mozilla's modeling indicated that receiving a lower revenue share percentage from Microsoft as a result of a prohibition on Google competing for placement would increase

the revenue deficit Mozilla faced on desktop from at least [redacted] annually to as high as [redacted] annually. Tr. 3144:16-25 (Muhlheim); RDX0340 at .006.

184. Mozilla expects that a switch to Bing compelled by a prohibition on getting paid by Google would force Mozilla to [redacted]. RDX0340 at .004.

D. Google's Proposed Remedies Are Consistent with the Court's Ruling and Provide Partners Flexibility.

185. Google's proposed remedies would prohibit the types of agreements that the Court found to be exclusive. Tr. 4202:9-04:7 (Murphy) ("[T]he Court found that the exclusive nature of Google's conduct contracting was anticompetitive. . . . A logical corrective remedy to that would be to take away the ability to have that exclusive contracting going forward.").

186. This is particularly appropriate because (i) Plaintiffs failed to show any causal connection between the present state of search rivalry and Google's conduct when set against a but-for world of non-exclusive promotion and (ii) AI-boosted rivals going forward are likely to differ from those who competed against Google in the past. Tr. 4319:22-20:25 (Murphy); RDXD-33.046; Tr. 3842:23-45:10 (Cue) ("AI is a huge technology shift, and so it's creating new opportunities for new entrants that just wouldn't exist otherwise."); *supra* § I.

187. Under Google's proposal, Google would not be able to license Play (or any other Google app) to OEMs conditioned on the distribution, preinstallation, or other promotion of Google Search or Chrome. Google's PFJ §§ III.A-B; Tr. 4319:22-20:25 (Murphy); RDXD-33.046.

188. Google's proposed remedies bar exclusive preinstallation of Google Search, Chrome, or the Gemini App in RSAs (or any other agreement with OEMs (including Apple) or Carriers). Google cannot license Play (or any other app) to OEMs conditioned on the OEMs or

wireless carriers refraining from distributing or promoting rival search engines, browsers, or AI assistant services. Google's PFJ §§ III.E-G; Tr. 4319:22-20:25 (Murphy); RDXD-33.046.

189. Google's proposed remedies also eliminate any "all-or-nothing" aspect of contracting for distribution or preinstallation of Google Search and Chrome across different access points on a device. In particular, they prevent Google from conditioning payment for Google Search and/or Chrome on particular access points on the OEM or wireless carrier also preinstalling or otherwise promoting Google Search or Chrome on other access points. This goes well beyond what is required to render the agreements non-exclusive. Google's PFJ § III.H; Tr. 4319:22-20:25 (Murphy); RDXD-33.046.

190. Google's proposed remedies would extend to the Google Assistant and Gemini apps as well, despite that the Court dismissed claims with respect to the Assistant, and that the Gemini app had not launched at the time of the liability trial. *United States v. Google LLC*, 687 F. Supp. 3d 48, 86 (D.D.C. 2023) (granting summary judgment on Plaintiffs' claims regarding Google Assistant); Tr. 650:14-51:20 (Hsiao (Google)) (Gemini had "just launched" in May 2024); Tr. 4321:1-22:6 (Murphy); RDXD-33.046; *see, e.g.*, Google's PFJ § III.G.

191. Under Google's proposed remedies, it would not be able to license Play, Search, or Chrome to OEMs conditioned on distribution, preinstallation, or other promotion of the Assistant or Gemini apps. Google's PFJ § III.C; Tr. 4319:22-20:25 (Murphy); RDXD-33.046.

192. Google's proposal would also prevent it from offering payment for the promotion of Search and/or Chrome on particular access points conditioned on the OEM or wireless carrier also preinstalling or otherwise promoting the Google Assistant or Gemini apps on other access points. Google's PFJ § III.J; Tr. 4319:22-20:25 (Murphy); RDXD-33.046.

193. Google also proposes a set of restrictions on its ability to enter into the types of deals with browser partners that the Court found to be exclusive. Liability Op. at 197-214.

194. *First*, Google's agreements with browser providers would "expressly permit" them to promote a rival search engine. Thus, for example, Google could not condition paying revenue share for the Safari default on Apple not promoting the Perplexity search service in Safari. Google's PFJ § III.K; Tr. 4322:7-23:12 (Murphy); RDXD-33.047.

195. *Second*, Google's proposal would enable partners to offer rivals, and rivals to compete for, the default position on the browsers for particular operating systems or the browsers' privacy mode. Google's PFJ § III.K; Tr. 4322:7-23:12 (Murphy); RDXD-33.047.

196. *Third*, under Google's proposal, it would not be able to enter into agreements longer than one year, so browser partners could re-evaluate their partnership annually. Google's PFJ § III.K; Tr. 4322:7-23:4 (Murphy); RDXD-33.047.

197. Although there is no evidence of Apple seeking shorter deal lengths or to partner with others, Google's proposal would give Apple additional flexibility should it so choose. Liability Tr. 2499:1-19 (Cue) (testifying that Apple asked for a [redacted] in 2020); DX0380 (2020 email from Cue to Google proposing "[redacted] deal"); Tr. 3842:2-16 (Cue).

198. Google's proposed browser remedies target the elements that the Court identified as making Google's browser contracts exclusive. The Court found the ISA exclusive because (i) it covered all Apple operating systems, including desktop and phones, Liability Op. at 158-59 (rivals cannot "access these channels"); (ii) it covered the default within all modes with Safari on a given device, *id.* at 204 (default on "*all* Safari search access points" (emphasis added)), 207 ("the *only* GSE preloaded on an Apple device" (emphasis added)); and (iii) it was longer than a

year, *id.* at 223-24. Google's remedy addresses these "breadth" and "depth" dimensions of the ISA, thus rendering it non-exclusive. Tr. 4323:24-24:6 (Murphy).

199. Consistent with Google's remedy eliminating exclusivity, Dr. Chipty offered no opinion that Google's proposed remedies would have been anti-competitive in the but-for world. Tr. 2306:10-20 (Chipty).

200. The fact that Google remains able to compete for distribution, and could result in Google winning promotional opportunities, does not make the result of that competitive process "exclusive." Tr. 4324:7-25:20 (Murphy) (explaining why including Google in competition for promotion is a "key part of the competitive process").

201. To the extent Dr. Chipty criticizes Google's remedies because Google would continue to win all or almost all of the distribution, she cites no evidence or analysis that in the but-for world, Google would have been any less successful. *Supra* §§ I.D-E.

202. And to the extent Dr. Chipty claims it will take longer for rivals to catch up—in her view, "overcome" entry barriers—under Google's proposed remedy, she sets the incorrect remedial goal. There is no evidence that rivals rapidly would have "overcome" entry barriers in the but-for world. Tr. 4248:13-49:18 (Murphy); RDXD-33.021.

203. Dr. Chipty also claims that Google's remedies still provide for exclusivity in some ways, but only offers that Google's remedies do not expressly permit browsers to vary the default on a version-by-version basis (e.g., iPhone 16, iPhone 17). Tr. 2304:15-06:3 (Chipty).

204. Dr. Chipty admits that new versions of devices are released every year or two, so in practice, Google's remedies do provide that flexibility. Tr. 2306:21-07:19 (Chipty).

III. DIVESTING CHROME WOULD DEGRADE ITS QUALITY, IMPEDE INNOVATION, AND HARM CONSUMER WELFARE.

205. Plaintiffs' RPFJ would require Google to "promptly and fully" divest all components of Chrome and Chromium, including those "that are critical, as informed by the views of the Technical Committee, to the full and proper functioning of Chromium or the Chrome browser," Pls.' RPFJ §§ III.F, V.A, and inclusive of "Google personnel that are essential to maintaining the quality of Chrome," RDX0705* at .012-.013. The Chrome buyer would be required to be "approved by the Plaintiffs in their sole discretion, subject to terms that the Court and Plaintiffs approve." Pls.' RPFJ § V.A.

206. Plaintiffs' RPFJ would prohibit Google from releasing any other web browser during the 10-year term of the Final Judgment. Pls.' RPFJ §§ III.M, V.A, XII.

207. Plaintiffs' Chrome divestiture proposal would apply worldwide—it would not, and could not, be limited to application in the United States. RDX0705* at .006.

208. Plaintiffs have not alleged, and no witness testified, that there was anything unlawful about Google's development and maintenance of Chrome and Chromium, including the design of Chrome to have Google Search set as the default search engine.

A. Chrome's Success Is the Product of Google's Investment and Innovation.

209. Google "built Chrome from the ground up." Tr. 2466:23-67:21 (Pichai (Google)). Google also developed Chromium, the underlying technology of the Chrome web browser. Tr. 2469:5-9 (Pichai). Google made Chromium freely available for others to build on via the Chromium open source project. Tr. 2468:4-69:4 (Pichai).

210. Google began developing the Chrome browser in 2006, and Google launched the Chrome web browser application and Chromium open source project in 2008. Tr. 1664:9-16 (Tabriz (Google)); Tr. 1471:1-14 (Mickens (Plaintiff Expert)); Liability Tr. 7646:5-7 (Pichai).

211. Google built Google Chrome and the open source Chromium project because Google saw an opportunity to innovate and build a much better browser. Tr. 2466:23-67:21, 2469:5-9 (Pichai); RDX0021* at .002; Liability Tr. 7644:22-46:4 (Pichai) (noting that Google developed Chrome in part because "browsers had stagnated").

212. Google's goal was not only to build a better browser, but to elevate the state of internet technologies across the board, so that all websites could get better. Tr. 2466:23-67:21 (Pichai); Liability Tr. 7646:18-47:10 (Pichai); RDX0021* at .002, .005.

213. Google is incentivized to invest and innovate in Chrome and Chromium in order to improve the functioning of the internet, which in turn benefits Google, as browsers are an important complement to Google's web-based services. Tr. 2466:23-67:21 (Pichai); Tr. 1604:9-05:13, 1667:9-17, 1685:15-86:8 (Tabriz); Tr. 4264:1-66:14 (Murphy) (explaining that Google invested in Chrome to improve its own browser, and Chromium to improve browsers generally, "to expand usage of the web, which is highly complementary to Search"); RDXD-33.034.

214. By 2014, Chrome was the most widely used browser in the U.S. Tr. 4264:1-66:14 (Murphy (Google Expert)); RDXD-33.034; RDX0630*; *see also* Liability Tr. 9738:20-39:19 (Murphy) (describing Chrome's growing share on Windows PCs (testifying about DXD-37.038)); DXD-37.038 (showing that Chrome usage exceeded Edge/Internet Explorer usage on Windows PCs in 2014).

215. Today, Chrome is the most popular and most used browser in the world, as well as "one of the world's most used pieces of software." Tr. 1627:5-22, 1662:18-63:2 (Tabriz).

216. Globally, Chrome has over 1.8 billion daily users, and over 4 billion monthly users. Tr. 1619:17-22, 1620:20-24 (Tabriz). The vast majority—over 80%—of Chrome's monthly active users are outside the United States. Tr. 1619:23-20:6 (Tabriz).

217. Chrome's core values are speed, stability, security, and simplicity. Tr. 1667:1-3 (Tabriz); RDX0021* at .003, .007-.009; Liability Tr. 7644:22-46:4 (Pichai) ("[W]e improved the execution speed of many of the applications by over 20 times by building Chrome.").

218. Chrome is very popular with users, both on platforms where it is offered as the default browser, as well as on platforms where it is not. For example, while Microsoft Edge is the exclusive browser that is preinstalled on Windows PCs, the majority of Windows users choose to download and use Chrome. Tr. 1608:7-10 (Tabriz) (68.4% of Windows users choose Chrome); Tr. 4264:1-66:14 (Murphy) (describing Chrome's success on Windows, Mac, and iOS platforms); PXR0206 at -513. Similarly, while the default browser on MacOS devices is Apple Safari, the majority of MacOS users choose to download and use Chrome. Tr. 1608:11-13, 1608:19-09:1 (Tabriz) (59.9% of MacOS users choose Chrome); PXR0206 at -513. And worldwide, to the extent that Search revenue flows into Google via users on Chrome, over 70% of that indirect revenue comes from users using Chrome on platforms where it is not the default browser. PXR0206 at -502 (71% of indirect Search revenue via Chrome is from users who use Chrome on Windows, iOS, and MacOS); Tr. 1617:21-18:6 (Tabriz).

1. Google Has Continually Invested in Chrome and Chromium.

219. Google does not underinvest in Chrome; to the contrary, Chrome has "probably the most investment of any browser in the world." Tr. 1624:12-24 (Tabriz).

220. Google has invested many billions of dollars in Chrome. Tr. 2467:22-68:3 (Pichai); PXR0215 at -257. Nearly a billion dollars per year goes directly towards developing and supporting the Chrome browser and the Chromium open source project. Tr. 1635:11-14, 1635:20-36:5 (Tabriz) (testifying about PXR0215 at -257); Tr. 1637:12-25 (Tabriz); Tr. 2469:12-70:1 (Pichai).

221. Chrome and Chromium benefit from efficiencies at Google, such that the costs Google associates with Chrome do not represent "the cost it would take to reproduce, to build Chrome from scratch." Tr. 1636:6-10, 1637:12-25 (Tabriz).

222. Within the Chrome team, at least 1,000 Google engineers are working directly on Chromium. Tr. 1665:14-19 (Tabriz); *see also* PXR0206 at -556.

223. Google is the "primary steward" of the Chromium open source project, investing the most resources in Chromium's ongoing innovation, maintenance, and operation. Tr. 1664:9-16 (Tabriz); *see also* Standal (Opera) Dep. Tr. 59:6-60:8 ("By far Google is the biggest contributor to the Chromium ecosystem . . . .").

224. Google has made over 90% of code contributions to Chromium in each of the last ten years. Tr. 1664:18-65:7 (Tabriz); Tr. 2468:4-69:4 (Pichai); RDXD-12.002; Tr. 2554:12-57:12 (Nieh (Google Expert)); Tr. 1565:10-16 (Mickens); Standal (Opera) Dep. Tr. 59:6-16; RDX0021* at .022; PXR0385* at -020.

2. Google Has Continually Innovated in Chromium.

225. Google's Chromium innovations have made the web faster, safer, and more stable, and have helped bring web applications to market. Tr. 1668:9-19 (Tabriz); RDXD-12.005; PXR0206 at -486, -506-07. Google's contributions to Chromium have enabled increasingly complex web applications to function. Tr. 1668:23-70:17 (Tabriz); RDXD-12.005-.006; Tr. 2466:23-67:21 (Pichai); RDX0021* at .021; RDX0071* at .104-.107.

226. For example, Google's investment in technologies like WebRTC as part of its Chromium development work made it possible for video-streaming applications to do real-time communication in a browser. Tr. 1668:23-69:15 (Tabriz); RDXD-12.006. Other Google initiatives in Chromium have made video streaming faster and more stable, and have allowed

developers to innovate with video on the web, even over low-bandwidth connections. Tr. 1668:23-69:15 (Tabriz); RDXD-12.005; RDX0021* at .025; PXR0206 at -486.

227. Other Chromium advances have enabled collaboration in web applications and access to web applications offline. Tr. 1669:16-70:4 (Tabriz). These productivity-focused innovations benefit both Google products like Drive and Workspace, as well as competing applications like Microsoft Office 365. Tr. 1669:16-70:4 (Tabriz); RDXD-12.006; PXR0206 at -506-07. Other Chromium technologies have enabled creation in web applications through technologies like WebAssembly ("WASM"), which makes it possible for complex software like Adobe Photoshop to run in a browser. Tr. 1670:5-17 (Tabriz); RDXD-12.006; RDX0071* at .117 (describing capabilities); PXR0206 at -486, -507.

3. Google Has Continually Innovated in Chrome.

228. Google has launched thousands of new features and improvements in Chrome over its 17-year history. Tr. 1666:8-68:8 (Tabriz).

229. Divesting Chrome from Google would jeopardize the existence of many features in Chrome, and would result in a degraded Chrome. *See infra* §§ III.B-D.

230. For example, Google introduced "Sign-in and Sync" functionality, whereby Chrome users can sign-in with their Google Account to personalize the browsing experience, including synchronizing their data, like settings, bookmarks, and browsing history, across all of their instances of Chrome, including across all of their devices. Tr. 1674:25-75:7 (Tabriz); RDXD-12.011; RDX0141* at .004-.019, .028-.033.

231. Once signed in, Chrome's "Autofill" feature allows users to automatically fill personal information, like passwords, credit card numbers, addresses, and other contact information, into web applications and web forms. Tr. 1676:2-24 (Tabriz); RDXD-12.012-.013; RDX0141* at .034-.039. This feature is valuable because it stores the information and syncs it

across devices, and users do not have to type this information. Tr. 1676:2-24 (Tabriz); RDXD-12.012-.013; RDX0071* at .035-.036 (autofill and payments innovations).

232. Google has advanced productivity features to help users get work done, for example, through more helpful tab organization. RDX0026* at .001-.004 (describing Chrome Intelligence features); RDX0021* at .012; RDX0071* at .029-.032; RDX0141* at .020-.021.

233. Google offers "Safe Browsing," a feature that keeps users safer from malicious web content on both Chrome and third-party browsers. Tr. 1670:18-71:1 (Tabriz); Tr. 2336:1-18 (H. Adkins (Google)); RDX0112* at .022 ("Google Safe Browsing warns users before they visit dangerous sites and protects users from web-based threats like malware, unwanted software, social engineering, phishing, and deceptive sites."); RDX0138* at .001-.008; RDX0141* at .045-.046; PXR0713* at -133.

234. Google also offers "Enhanced Safe Browsing" to Chrome users, which provides more advanced security protection using AI and additional telemetry collected from users and sent to Google's Safe Browsing servers, to help detect active attacks in real time. Tr. 1673:17-74:9 (Tabriz); Tr. 1581:2-11 (Mickens); RDX0112* at .022 ("on-device and server-side models . . . look for signals commonly associated with malicious behavior," and offer "additional file protections like deep scans for suspicious files [to] protect users from the latest malware"); RDX0129* at .001-.005; RDX0141* at .045-.046.

235. When a user opts in to Enhanced Safe Browsing, a snippet of the web page that the user seeks to visit is shared with Google, allowing Google to identify with greater accuracy whether the webpage is malicious. Tr. 2336:19-37:1 (H. Adkins); PXR0713* at -133-136 (describing how Chrome telemetry helps Enhanced Safe Browsing detect malicious sites that cannot otherwise be detected, even by Google crawling URLs). As of 2025, over a billion

Chrome users have opted in to Enhanced Safe Browsing. Tr. 1674:10-13 (Tabriz). Enhanced Safe Browsing data is linked to a user's Google Account, so Enhanced Safe Browsing provides protection across Google services, "for example increasing protection in Gmail after a security incident." RDXD-12.010; Tr. 1674:4-6 (Tabriz).

236. Chrome's "Automatic Update" functionality is important to the security of Chrome users, including for quickly delivering emergency bug fixes. Tr. 2545:8-46:3 (Nieh); RDX0141* at .041, .064. This Chrome innovation has been "transformational in terms of software security." Tr. 1670:18-71:1 (Tabriz); RDX0112* at .016; RDX0025* at .051-.052; RDX0115* at .026.

237. "Password Manager" and "Password Check-up" are innovations built by the Chrome team in collaboration with the Google Identity team and other teams at Google. Tr. 1672:5-15 (Tabriz). These features are deeply integrated into Chrome to allow users to save, store, and autofill passwords across devices, as well as receive alerts for passwords that are reused or weak, or that have been compromised in a data breach. Tr. 1670:18-72:12 (Tabriz); RDX0141* at .035.

238. Chrome has introduced a variety of innovative features that make the web more accessible. Tr. 1678:4-6 (Tabriz); RDX0071* at .176 (describing ways Chrome can "make web content accessible, even when developers don't"). These accessibility features include "Chrome Reader Mode," "AI Image Descriptions," "Live Captions," and advanced translation capabilities. *See* Tr. 1678:4-80:9 (Tabriz); PXR0206 at -508-09; RDX0071* at .176; RDX0141* at .060, .062, .065-.068 (example of webpage translation); RDX0026* at .002-.003.

239. Google also introduced "Chrome Enterprise," a version of Chrome used by IT teams at schools, small-and-medium-sized businesses, as well as Fortune 500 companies, with

300 million monthly active users. Tr. 1650:14-51:10, 1681:1-11 (Tabriz); RDX0021* at .019; RDX0071* at .128 (selection of Enterprise customers); PXR0206 at -573 (same). Chrome Enterprise includes the innovative features of Chrome, as well as additional functionality that allows IT administrators to manage features and settings across a number of devices, all of which have made the web safer for organizations and users. Tr. 1670:18-71:1, 1680:10-23 (Tabriz); RDX0071* at .131-.149 (selection of Chrome Enterprise features and capabilities); PXR0206 at -508-09 (describing Enterprise innovations).

4. Chromium Promotes Browser Competition in a Competitive Space.

240. Chrome actively competes with other browsers. Tr. 1659:10-12 (Tabriz); *see also* PXR0215 at -249 ("Competition in browsers is increasingly strong with growing investment in the space," and Chrome faces "[c]ompetitive pressure" from "incumbents and well-funded new entrants"); RDX0038* at .009-.014 (describing competitive landscape).

241. Chromium is an open-source browser platform, and those who want to develop their own browser can build on Chromium, today, for free. Tr. 1582:25-83:5 (Mickens).

242. Many companies have built browsers based on Chromium, including Microsoft Edge, Vivaldi, Opera, Brave, Arc, Samsung Internet, UC Browser, Ecosia, Amazon Silk, and Island. Tr. 1666:8-25 (Tabriz); RDXD012.003; Tr. 1450:18-25 (Mickens); *see also* Tr. 1261:1-5 (Provost (Yahoo)) (Yahoo is building a "prototype" browser based in part on Chromium); Tr. 4264:1-66:14 (Murphy); RDXD-33.034.

243. AI companies can use and are using Chromium to build their own browsers, such as Perplexity's upcoming Comet browser. Tr. 2470:2-9 (Pichai); Tr. 790:13-18 (Shevelenko (Perplexity)); *see also* Tr. 518:17-19 (Turley (OpenAI)) (OpenAI explored building a browser based on Chromium).

244. Chromium-based browsers differentiate their products based on the features they offer through integrations, including through APIs to backend servers. Tr. 1451:8-52:23, 1468:22-70:1 (Mickens) (explaining that Chrome's integrations with Google services via private APIs "provides a series of value-adds" compared to Chromium); Tr. 1663:24-64:8 (Tabriz) ("what makes Google Chrome, Chrome, as opposed to any other Chromium browser, is integration with a number of Google services . . . that run on Google code and Google servers").

245. Both established and forthcoming browsers have integrated AI capabilities, including Microsoft Edge's integration of Copilot and Perplexity's Comet browser. Tr. 1659:10-20 (Tabriz); RDX0038* at .014 ("Many of the world's most popular browsers are embracing AI, with built-in AI chatbots and genAI-driven features."), .027 (browser AI features comparison).

246. Google's ownership of Chrome and Chromium enhances browser competition. Tr. 4264:1-66:14 (Murphy); RDXD-33.034 ("Microsoft's share of browser usage has increased since it started using Chromium[.]").

B. Chrome Relies on Google for a Wide Variety of Administrative, Technical, and Cybersecurity Functions.

247. Chrome does not operate as a stand-alone business and has a variety of dependencies on Google. Tr. 1682:1-4 (Tabriz). The Chrome team, which develops both the Chrome browser application and the web platform, relies on Google for "most of the shared functions that are needed to run . . . an organization." Tr. 1598:24-99:4, 1648:2-5, 1682:9-16 (Tabriz); RDX0021* at .021-.023. For example, the Chrome team relies on Google for administrative functions including finance, marketing, human resources, and office space. Tr. 1682:9-16 (Tabriz); Tr. 3883:25-84:14 (Samat (Google)) (identifying shared functions supporting all Google products).

248. The Chrome team consists of 1,200 Google employees and is organized within Google's Platforms and Devices ("P&D") product area ("PA"). Tr. 1599:25-1600:2, 1662:9-10 (Tabriz). About half of the Chrome team is located in the United States, and the rest of the Chrome team is highly distributed, across Canada, Europe, and Asia. Tr. 1662:11-16 (Tabriz).

249. The Chrome team relies on Google's Core PA, which "provides the centralized services and infrastructure upon which [Google] run[s] the company." Tr. 2321:6-10 (H. Adkins). Google layers security and privacy protections into the central infrastructure, so Google's individual products do not have to build infrastructure, including security assurance, for themselves. Tr. 2321:11-19 (H. Adkins); RDX0112* at .025.

250. "Chrome today represents 17 years of close collaboration between the Chrome team and many other teams across Google," because Google "work[s] as one company." Tr. 1684:20-85:14 (Tabriz). Chrome benefits from the efficiencies created by being part of Google in many ways, including the systems used by Chrome engineers on a daily basis, feature development, security, and research and development. Tr. 1683:9-85:14 (Tabriz).

251. For example, Chrome engineers use and rely on shared developer tools that Google's Core PA provides for all Google developers. Tr. 1683:9-17 (Tabriz); Tr. 1563:22-64:15 (Mickens). Chrome also relies on Google3, Google's proprietary code base, which is running on Google's servers in Google's data centers, with Google's hardware and proprietary software. Tr. 1682:20-83:8 (Tabriz); Tr. 1564:16-22 (Mickens); RDX0037*.

1. Chrome and Chromium Have Extensive Dependencies on Google and Its Technical Infrastructure.

252. Chrome and Chromium extensively rely on Google's technical infrastructure, which is "custom built and purpose built," to provide consistency and reliability at a global scale. Tr. 2525:10-27:2, 2534:22-46:13 (Nieh); Tr. 1673:6-8, 1674:14-24, 1675:16-76:1, 1678:4-80:9,

1682:20-83:8 (Tabriz); *see also* Tr. 1442:21-43:12, 1564:23-65:2, 1568:16-69:5 (Mickens). Google's bespoke, hyperscale infrastructure is "an engineering marvel" that is "able to operate at [an] enormous scale to service billions of users." Tr. 2525:10-27:2 (Nieh).

253. The Chromium project relies on Google "to 'keep the lights on,' including having thousands of servers endlessly running millions of tests, responding to hundreds of incoming bugs per day, ensuring the important ones get fixed, and constantly investing in code health to keep the whole project maintainable." PXR0385* at -020-021; *see* Tr. 2337:4-8 (H. Adkins).

254. Chrome depends on many Google technical infrastructure systems, including, but not limited to, Google's content delivery network, Google Front End, Global Service Load Balancer, Borg, Colossus, Spanner, Bigtable, Kansas, and GAIA—all of which themselves have complex interdependencies on other Google systems. Tr. 2525:10-34:8 (Nieh); RDXD-17.020-.024; RDX0050* at .019, .026, .038 (Chrome Sync); RDX0065 at .001; *see also* Tr. 1531:1-33:2 (Mickens) (describing how Borg is used by other Google products).

255. At a technical level, the Chrome browser is composed of "client-side" code that runs on a user's device, like a laptop or smartphone, plus a large quantity of "server-side" code that runs on Google backend servers. Tr. 2534:22-36:3 (Nieh); RDXD-17.018.

256. Many of Chrome's features thus rely on Google's backend systems to function. Chrome features that will not work without connection to Google backend servers include Automatic Updates, Safe Browsing, Sign-in and Sync, Live Caption, Translation, and more. Tr. 2536:4-40:6 (Nieh); Tr. 1673:6-76:1, 1678:4-80:9 (Tabriz); PXR0713* at -137.

257. For example, Chrome's Sign-in and Sync and Autofill features are developed by the Chrome team and run mostly on Google's shared backend infrastructure, not in the client browser application. Tr. 1675:16-76:1, 1677:2-4 (Tabriz); Tr. 2539:12-43:5 (Nieh); RDXD-

17.020-.021; RDX0021* at .016. Similarly, Chrome's Password Manager and Password Check-up features are developed by the Chrome team, run mostly on Google's shared backend infrastructure, and rely on Google's shared infrastructure for things like sign-in, storage, and security intelligence (i.e., to check passwords against databases of compromised credentials). Tr. 1672:16-73:8 (Tabriz). Chrome also relies on "close collaboration" with Google's Payments team to store and protect payment information. Tr. 1677:5-19, 1682:20-83:8 (Tabriz).

258. A critical piece of Chrome functionality is Google's cross-product user account infrastructure, run by the Google Accounts team in Google's Core PA, including Google's GAIA service. Tr. 1675:8-15, 1682:20-83:8 (Tabriz); Tr. 2532:9-34:8, 2539:12-43:5 (Nieh); RDXD-17.020-.021. The massive infrastructure that stores Chrome user data is protected by Google security, composed of "the world's best security teams." Tr. 1675:8-15 (Tabriz).

259. Chrome's Automatic Update feature depends on Google's backend infrastructure, including Google's global content delivery network, which "makes it possible for users to get those updates quickly and efficiently at the scale of billions of users." Tr. 2545:8-46:3 (Nieh); RDXD-17.023; RDX0055A ("Due to the scale and complexity of Chrome, the release infrastructure is also large, complex and has many dependencies . . . . When these systems fail, we run the risk of not being able to release a new version of Chrome, which is critically important for things such as emergency bug fixes[.]").

260. Chrome's Optimization Guide features, including price tracking, About this Page, AI-powered network and safety optimizations, and more, are developed by the Chrome Intelligence subteam, but depend on many layers of Google backend infrastructure to function, as well as AI models developed by Google DeepMind. Tr. 2543:6-44:1 (Nieh); RDXD-17.021; Tr. 2546:14-24 (Nieh) (noting that Optimization Guide requires tens of thousands of servers to

run in order to support billions of users); RDX0026* (summarizing dozens of features powered by Chrome Intelligence, including GenAI and non-GenAI features); *see also* Tr. 1575:4-13 (Mickens) (Professor Mickens does not know how many engineers work on Chrome Intelligence or how much work it would take for a third party to recreate that system).

261. Other Chrome features with dependencies on Google include Chrome's robust translation features, which are enabled by Google Translate services running on Google backend infrastructure, Tr. 2544:14-45:7 (Nieh); accessibility features, many which rely on proprietary technologies developed by other teams at Google, including Google Research, Tr. 1678:4-80:9 (Tabriz); and security features like Enhanced Safe Browsing, which relies on shared Google infrastructure and technologies developed by the Safe Browsing team in Google Cloud, Tr. 1674:14-24 (Tabriz); Tr. 2336:1-18 (H. Adkins); RDX0071* at .061; PXR0713* at -133, -137.

262. Under Plaintiffs' proposal, Google's shared technical infrastructure would not be part of any Chrome divestiture. RDX0705* at .012 ("For assets shared between Chrome and other Google products, Plaintiffs do not believe that those assets would necessarily need to be fully divested . . . ."); Tr. 1584:3-22 (Mickens) ("It's possible for the new owner to just get ownership of the client-side code and not necessarily have to take any parts of the back-end infrastructure over."); Tr. 1587:1-8 (Mickens) ("[T]he new owner of Chrome would not, in fact, want to try to cleave out huge parts of Google's back-end server infrastructure and code because that would be technically challenging, and also I imagine not actually what that new buyer of Chrome wants to do.").

2. Chrome Has Extensive Dependencies on Google for Cybersecurity.

263. In addition to relying on Google to provide user-facing security features, Chrome and Chromium depend on Google to provide protections against cybersecurity threats. Tr. 1683:18-84:17 (Tabriz); Tr. 2341:14-43:16 (H. Adkins); RDX0025* at .044.

264. In the modern age, threat actors have increasingly turned to the cybersphere to attack users, governments, and critical infrastructure. Tr. 2327:2-23 (H. Adkins); *see also* RDXD-16.004; PXR0306 at -350. Some attacks are state-sponsored; the biggest actors in this venue are China, Russia, Iran, and North Korea. Tr. 2327:7-14 (H. Adkins); RDX0114*; RDX0116* at .014, .016. Other attacks stem from commercial surveillance vendors, who provide hacking capabilities for a fee. Tr. 2327:15-23 (H. Adkins); RDX0025* at .015-.025; RDX0115*; RDX0116* at .014-.015.

265. Entities that need to defend against cybersecurity threats are in an asymmetrical position against threat actors, encapsulated by the "defender's dilemma": A company or entity in a defense position managing complex systems must maintain its defenses 100% of the time to avoid a threat, but a threat actor need only exploit one weakness in a system to compromise it. Tr. 2326:9-20 (H. Adkins); RDXD-16.003.

266. Google has also been a champion of cybersecurity innovation. Tr. 2324:11-25 (H. Adkins). Google has adopted a "secure by design" approach, wherein Google designs its products with security in mind at the beginning of the process. Tr. 2325:1-16, 2331:3-16 (H. Adkins). The "secure by design" approach "involves using secure coding practices, conducting security reviews, and embedding security throughout the design process" to ensure that "security is not an afterthought but an integral part of the system's DNA." RDX0112* at .003.

267. Chrome and Chromium are among the "most attacked pieces of software in the world." Tr. 1683:18-84:17 (Tabriz). Chrome and Chromium are targets of cyberattacks because they are installed on billions of devices; if a threat actor gains control of Chrome or Chromium software, the threat actor would have control of billions of devices across the planet. Tr. 2335:2-7 (H. Adkins); Tr. 2481:11-82:14 (Pichai); RDX0025* at .036 ("It's not hyperbolic to say that keeping Chrome secure has a pivotal role in the safety and security of society . . . .").

268. Google applies the "secure by design" approach to Chrome; for example, it "was built with secure-by-design technology to provide security patches regularly and automatically to Chrome users, reducing the window of vulnerability for exploits." RDX0112* at .016; Liability Tr. 7644:22-46:4 (Pichai) (Chrome "made [web] applications much more secure for users").

269. Google has 7,000 to 8,000 employees dedicated to cybersecurity, and the Chrome team relies on these resources for a variety of security functions and protections, including "red team" protection from hackers, security experts who perform security reviews, "fuzzing" infrastructure (a security technique that helps developers find software bugs), and security testing infrastructure to test software. Tr. 2320:23-21:3, Tr. 2342:16-43:16 (H. Adkins); Tr. 1683:18-84:17 (Tabriz); RDX0025* at .044. Chrome also relies on Google's Threat Analysis Group (TAG), which tracks the latest and most malicious active attackers, whether they are nation-states or malware authors. Tr. 1683:18-84:17 (Tabriz); RDX0025* at .027, .031, .039 (examples of TAG identifying Chrome exploits); RDX0115* at .004, .009, .014-.015, .022-.023, .026.

270. The Chromium open source project also depends on Google for security. Tr. 2337:4-8 (H. Adkins); Tr. 1683:18-84:17, 1687:22-88:13 (Tabriz); RDX0071* at .098 (Chrome and Google-wide "security work has a positive impact on all Chromium-based browsers, thus benefiting the web ecosystem as a whole").

271. Under Plaintiffs' proposal, Google's shared security infrastructure would not be part of any Chrome divestiture. RDX0705* at .012 ("For assets shared between Chrome and other Google products, Plaintiffs do not believe that those assets would necessarily need to be fully divested . . . ."); *see also* Tr. 1584:3-22, 1587:1-8 (Mickens).

C. Divesting Chrome Would Pose Immeasurable Challenges.

272. Divesting Chrome would be highly challenging because of Chrome's many dependencies on shared Google services, and reliance on Google backend systems for functionality. *Supra* § III.B; Tr. 1684:20-22, 1701:5-12 (Tabriz); Tr. 2515:22-17:22, 2547:22-54:11 (Nieh).

273. Attempting to divest a fully functional Chrome would require the buyer of Chrome to create an architectural development plan, establish hardware and software infrastructure, enable scalability, migrate data and re-establish partnerships, and then optimize the resulting systems. Tr. 2547:22-51:16 (Nieh); RDXD-17.025.

274. Attempting to divest the Google back-end code that provides Chrome functionality would be "technically challenging" to such a degree that a divestiture buyer would likely not attempt it, Tr. 1587:1-8 (Mickens), because the code at issue is "custom built for the needs of Google," and written to run on Google's proprietary hardware, Tr. 2524:9-27:21, 2532:9-34:8 (Nieh).

275. It is not feasible to divest a fully functional Chrome as it exists today. Tr. 2515:22-17:22, 2632:14-33:15 (Nieh); Tr. 1701:17-02:10 (Tabriz) (even with "lots of smart people," this is not a situation in which "anything is possible"); Tr. 1466:16-67:6 (Mickens) (testifying that divestiture of Chrome "likely changes Chrome").

276. Even divesting a version of Chrome that is not fully functional would likely take five or more years. Tr. 2551:17-53:11, 2632:14-33:10 (Nieh); *see also* Tr. 1684:20-85:14

(Tabriz) (proposed divestiture "magnitudes more complex" than several large, multi-year projects); Tr. 1701:5-12 (Tabriz) ("I can't think of a more complex and higher-risk project."); Standal (Opera) Dep. Tr. 13:2-14:16 (discussing four or five-year migration of Opera browser to Chromium); Tr. 2552:17-53:11 (Nieh) (discussing Standal testimony). Professor Mickens did not estimate the time needed for divestiture. Tr. 1583:24-84:2 (Mickens).

277. Data migration for billions of Chrome users' data would be just one aspect of the technical challenge of divestiture; this alone would be extremely difficult, since billions of users would continue to use that data during the period of migration. Tr. 2547:22-51:16 (Nieh).

278. Plaintiffs' computer science expert opined that, for each Chrome feature that relies on an application programming interface ("API") to communicate with Google backend servers for functionality, the Chrome buyer could (i) leave the API call unmodified; (ii) proxy the API call to a proxy server; (iii) substitute with a third-party API; or (iv) disable the API. Tr. 1458:20-59:5 (Mickens); PXRD010 at 37. However, these proposals have their own challenges, *see infra* ¶¶ 279-283, and would degrade the quality of Chrome, *see infra* § III.D.1.

279. Plaintiffs' proposal to divest the Chrome client application while relying on ongoing API connections to Google or other services (i.e., leaving the API call "unmodified" or accessing it via proxy server) presents significant logistical challenges because there are hundreds of software integrations in Chrome that were not built for sharing with a third party. Tr. 1686:9-87:7 (Tabriz); Tr. 2598:14-06:9 (Nieh); Tr. 1468:22-70:2 (Mickens) (explaining that "private APIs . . . are not available to" other Chromium-based browsers); *see also* Tr. 1569:6-71:23 (Mickens) (Professor Mickens has not "looked at every single one" of Chrome's hundreds of private APIs, identified which teams within Google maintain these APIs, or analyzed the number of employees or level of effort required to maintain these APIs).

280. Chrome APIs cannot be left "unmodified" after divestiture because most of the APIs are private, requiring Google to build support and billing infrastructure, make modifications to allow the divested Chrome's infrastructure to communicate with the Google backend through a common language and interface, create new documentation, and enter licensing agreements. Tr. 2534:22-36:3, 2538:17-39:25, 2598:14-2606:9 (Nieh); Tr. 1685:15-18, 1686:9-86:7 (Tabriz) (integrations and libraries were not "designed initially for use by an independent entity," and one cannot "expect to be able to just reuse them"); RDX0061* (selection of Chrome APIs showing selected subset of private APIs); RDX0072* (annotated list of Chrome modules with network connections, including over 200 connections to Google backend services); Tr. 1461:6-20 (Mickens) (Google and the buyer would need "to agree to some type of term . . . there would have to be some contractual agreement between Google and the new buyer").

281. Plaintiffs' proposal to "proxy" Chrome APIs merely inserts an intermediary server between the Chrome client and Google backend server, solving none of the technical or feature-loss hurdles of leaving APIs "unmodified" as described above. Tr. 2606:12-08:18 (Nieh); Tr. 1463:5-64:2 (Mickens) ("That proxy machine will then forward the request to the Google back-end API server.").

282. APIs that pertain to user data have further logistical difficulties because of security, privacy, global compliance, and user consent concerns. Tr. 2598:14-606:9 (Nieh); Tr. 1688:14-89:9 (Tabriz); Tr. 1574:11-18 (Mickens) (Professor Mickens did not consider user agreements); *see* RDX0050* at .016 (4.2 billion Chrome users make 1.3 million queries per second to Sync servers; Google stores approximately 1.7 PiB of user data, excluding browsing history and logs), .042 (describing aspects of special handling for Enterprise data).

283. If the team that currently builds and manages both the client- and server-side of existing Chrome APIs is divested, Google would have limited capacity and expertise maintaining the server-side functionality. Tr. 2598:14-606:9, 2640:13-24 (Nieh). Further, many Chrome innovations have been developed in close collaboration with other internal Google teams, which would no longer be possible in the same way after divestiture, leading to Chrome features becoming out-of-date. Tr. 1686:14-87:7 (Tabriz).

284. Even assuming that all of the challenges involved in modifying Chrome's current APIs for use by a divestiture buyer could be overcome, divesting Chrome in a manner that relies on API connections would still take years. Tr. 2643:23-45:12 (Nieh).

285. There is no evidence that a divestiture of a complex software product of the scale proposed in this case has ever been attempted. Tr. 1684:20-85:14 (Tabriz) (untangling 17 years of dependencies "unprecedented"); Tr. 2613:25-16:17 (Nieh); *see* Tr. 1581:25-83:5 (Mickens) (his examples of software becoming open source did not involve as much code as Chrome).

D. Divesting Chrome Would Cause Widespread Harm Without Materially Shifting Search Share.

286. Divesting Chrome would harm browser competition, innovation, and users globally—but would be unlikely to materially shift search share to rivals. Tr. 4267:10-68:23 (Murphy) ("You're taking Chrome from somebody who's able to do the most in developing an independent browser and browser engine and giving it to somebody else," and that would reduce innovation); RDXD-33.036. Dr. Chipty estimates that divesting Chrome would shift only about 7% of search volume (~3% in mobile), assuming that the quality of divested Chrome does not degrade. Tr. 4267:10-68:23 (Murphy); RDXD-033.036; Tr. 2292:16-93:17 (Chipty (Plaintiff Expert)).

287. Dr. Chipty did not analyze how a Chrome divestiture would impact the welfare of billions of consumers of web browsers and the products that rely on them. *See* Tr. 2294:16-95:14 (Chipty) (testifying that "it's possible" a new buyer of Chrome won't be as successful at Chrome as Google has been and not offering an opinion as to whether Chromium divestiture will be successful); Tr. 4267:10-68:23 (Murphy).

1. Divesting Chrome Would Degrade the Quality of Chrome.

288. There is no practical way to divest a fully featured Chrome as it is today. Tr. 2515:22-17:22 (Nieh); *see also* Tr. 1458:9-19 (Mickens) ("divestiture means that Chrome may change in certain ways"); Tr. 1466:16-67:6 (Mickens) ("divesting Chrome . . . likely changes Chrome"; "the user-facing experience of Chrome may end up looking different than it does now"); PXRD010 at 36 ("Divesting Chrome . . . May Change Chrome"); Tr. 1664:3-8 (Tabriz) ("[W]hat makes Google Chrome, Chrome, as opposed to any other Chromium browser, is integration with a number of Google services, products, things that run on Google code and Google servers . . . .").

289. Even if Google were to continue to provide existing web browser services to the Chrome buyer, pursuant to Professor Mickens' "leave unmodified" or "proxy" options, *see supra* ¶¶ 278-283, in a world where Google is prohibited from offering its own web browser, Google would not be incentivized to innovate or improve those features, which would lead to the degradation or discontinuation of the features. Tr. 1688:14-89:9 (Tabriz); *see also* Tr. 2598:14-2601:10 (Nieh) ("if everything is static, then things don't improve, and then eventually -- essentially the features stagnate and become out of date").

290. Hence, in a "best case" scenario where the significant challenges to Google providing existing APIs were overcome, and Google was able to grant access to current Chrome functionality, the existing APIs would likely stagnate and become out of date. Tr. 2598:14-

2601:10 (Nieh); Tr. 1686:14-86:7, 1688:14-89:9 (Tabriz) (noting that divestiture "has a best-bet outcome of having a product that is a shadow of current Chrome"; and "after years of technical refactoring," the most optimistic outcome would be a Chrome "that has decayed, regressed in quality and security[,] and probably becomes insecure and obsolete," which "is really sad").

291. There are no "substitute" APIs that exist to replace existing APIs for many Chrome features, including Optimization Guide and Enhanced Safe Browsing, and where similar APIs exist, such as for translation, the functionality is inferior to what Chrome provides today. Tr. 2606:12-09:25 (Nieh); Tr. 1579:22-80:10, 1581:19-22 (Mickens) (Professor Mickens did not analyze whether comparable APIs exist).

292. If Chrome APIs are "disabled," that means that the functionality supporting Chrome features is "no longer available, and you have a Chrome client in the end that doesn't function properly." Tr. 2606:12-09:25 (Nieh). "[W]hat makes Chrome, Chrome is all these back-end services that provide all these features. So if you are disabling them, essentially it looks a lot like you are just divesting Chromium, not Chrome." Tr. 2606:12-09:25 (Nieh).

293. Whereas Google has significant incentives to invest in Chrome and Chromium, potential Chrome buyers likely would not, because it is likely that their business would have fewer complementarities as compared to Google, and are thus unlikely to invest as much in Chrome and Chromium. Tr. 4266:15-67:9 (Murphy); RDXD-33.035 ("Another party would lack Google's incentives to invest in Chrome/Chromium" because they "[d]o not benefit from expanding usage of the open web in the same way as Google"). Buyers' reduced incentives to invest in Chrome would harm users. Tr. 4264:1-66:14 (Murphy).

294. If divestiture is ordered, "there's [also] a high risk of impact to talent" on the Chrome team. Tr. 1688:14-89:9 (Tabriz). It is not likely that "people will still want to work on

Chrome," and a loss of Chrome talent further increases the likelihood that a divestiture of Chrome would fail. Tr. 1688:14-89:9 (Tabriz).

295. For these reasons, *supra* ¶¶ 288-294, divestiture would be to the detriment of the many "users [who] use Chrome" as well as "organizations [that] depend on Chrome to keep their work force productive and safe," and would harm consumer welfare. Tr. 1688:14-89:9 (Tabriz).

2. Divesting Chrome Would Degrade Cybersecurity for Chrome Users and Harm National Security Interests.

296. Google has a strong cybersecurity record, thanks to its dedication to secure architecture and commitment to cybersecurity. Tr. 2323:17-24:10, 2390:6-17 (H. Adkins); *supra* § III.B.2.

297. Google's strong cybersecurity record is even more pronounced when compared to that of its competitors. Microsoft, for example, has experienced numerous cybersecurity issues in its history. In the late 1990s, Microsoft experienced "very famous attacks that took down large parts of the infrastructure." Tr. 2330:6-31:2 (H. Adkins). More recently, Microsoft has continued to experience cyberattacks. Microsoft experienced a prominent attack in 2023 that led to the breach of senior U.S. Government officials as well as the theft of tens of thousands of U.S. State Department emails. Tr. 2330:6-31:2 (H. Adkins); Tr. 1074:12-24 (Schechter (Microsoft)); RDX0117* at .004-.007 (describing "cascade of Microsoft's avoidable errors").

298. Potential Chrome buyers are unlikely to be able to provide the same level of security that Google does. *See* Tr. 2341:14-42:15 (H. Adkins). For example, start-up companies, such as OpenAI and Perplexity, tend to prioritize velocity on the product side over security. Tr. 2332:11-21 (H. Adkins). And notably, OpenAI, Meta, Yahoo, DuckDuckGo, and Perplexity have not signed the federal Cybersecurity and Infrastructure Security Agency's "secure by design" pledge. *See* Tr. 2331:17-32:4 (H. Adkins).

299. Google uses data received from Chrome to conduct analysis of the cybersecurity threat landscape and to assist the U.S. Government with cybersecurity. Tr. 2336:1-18, 2344:14-46:1 (H. Adkins); *see also* Tr. 2348:9-51:14 (H. Adkins); Tr. 2554:12-57:12 (Nieh).

300. Divesting Chrome risks user security, because defending Chrome from cyberattacks is a significant responsibility that requires substantial resources, talent, culture, and technology to do successfully. Tr. 2341:14-42:15 (H. Adkins) ("[T]he scenario I worry about with a divestiture of Chrome is would the receiving party be able to protect it. You're not just buying software. And you're not just buying the users. You are buying the responsibility to protect the installs in 4 billion machines. And if you think about the things we've had to do to defend Chrome and some of the practices that we see generally in the industry, I worry whether they stand a chance in that defender's dilemma if they don't have the resources, the talent, the culture and the technology to really defend that at scale.").

301. If Chrome is divested, it would no longer be able to rely on many Google security capabilities, including those that protect Chrome developers, the Chrome build and release processes, Chrome user data, and more. Tr. 2342:16-43:10 (H. Adkins).

302. Divesting Chrome would therefore likely result in degraded cybersecurity for users and the U.S. Government, which would harm consumer welfare. *See supra* ¶¶ 296-301.

3. Divesting Chrome Would Degrade or Destroy the Chromium Open Source Project and Products That Are Built On It.

303. Divesting Chrome would degrade Chromium, which in turn would degrade the products built on Chromium. Tr. 2515:22-17:22, 2554:12-57:9 (Nieh); Tr. 4264:1-66:14 (Murphy) ("From the point of view of Chrome and Chromium, Google has done as well or better . . . than anybody else in the marketplace at an independent browser and a browser engine in Chromium. . . . If you're focused on competition and consumer welfare, why would you take

something away from somebody who's been the most successful with it and give it to somebody else[?]").

304. Chromium is important to the web ecosystem. Many third-party browsers, such as Microsoft Edge, Opera, Brave, and Samsung Internet, are built on Chromium. Tr. 1662:18-63:2, 1666:8-25 (Tabriz); RDXD-12.003; Kim (Samsung) Dep. Tr. 49:23-50:18; *see also* Tr. 790:13-18 (Shevelenko) ("Perplexity's upcoming Comet Browser will be based on Chromium"); Standal (Opera) Dep. Tr. 68:8-69:11 ("Chromium is important to the web ecosystem."); Tr. 4264:1-66:14 (Murphy); RDXD-33.035.

305. In addition to browsers, Chromium is also used by Google and third-party web applications. Tr. 1662:18-63:2, 1666:8-25 (Tabriz); RDXD-12.003. Google's Android WebView, which renders web content in Android applications, is based on Chromium, as is Electron, a software development kit on which applications like Slack are based. Tr. 1662:18-63:2, 1666:8-25 (Tabriz); RDXD-12.003; Tr. 2554:12-57:12 (Nieh) (WebView is "at risk" if Chromium is "at risk"); Tr. 1476:12-77:8, 1565:21-66:25 (Mickens). Chromium is also used in home electronics from LG and custom applications like Bloomberg terminals and SpaceX capsule control software. PXR0385* at -020.

306. Google's support of Chromium is critical to the success of the project. Tr. 2554:12-57:12 (Nieh); Tr. 1687:22-88:13 (Tabriz) (Google is "the primary contributor, primary investor in Chromium."); Standal (Opera) Dep. Tr. 68:8-69:11 (Google's important role in the Chromium ecosystem is irreplaceable because "not only do you need to have the funds to [support Chromium], but you also need to have the know-how and expertise to do that. I would not be surprised if it is some of the world's best engineers that [are] working on Chromium and Blink [the engine inside Chromium]"); Standal (Opera) Dep. Tr. 71:1-72:6 (if Google were

required to fully divest Chrome, "I would be extremely concerned about the future of the Chromium ecosystem, as it sits there, because I do not understand who will have the capacity and the technical know-how to operate Chromium to the extent and to the possible extent that it has been in the current ecosystem"); PXR0385*.

307. Other Chromium contributors provide single-digit percentages of changes to the Chromium project, including major companies like Microsoft and Samsung. Tr. 1664:18-65:7 (Tabriz); RDXD-12.002; PXR0385* at -020. For example, OpenAI, Perplexity, and Yahoo have not made any known contributions to the Chromium project. Tr. 1665:8-13 (Tabriz).

308. If Chrome were divested and Google could not operate a browser for the term of a Final Judgment, Google could not be expected to provide the same level of support to the Chromium project. Tr. 1687:22-88:13 (Tabriz); Kim (Samsung) Dep. Tr. 49:23-50:18.

309. Most of the engineers who contribute to the Chromium project are on Google's Chrome team, and losing that team to divestiture would of necessity "radically change Google's investment" in Chromium. Tr. 1687:22-89:9 (Tabriz); Tr. 2554:12-55:7 (Nieh).

310. Others outside of Google cannot be counted on to contribute to Chromium at the same rate as Google does, because they lack Google's incentives to do so, and they are not doing so today. Tr. 1687:22-88:13 (Tabriz); Tr. 4266:15-67:9 (Murphy). Potential Chrome buyers like OpenAI, Perplexity, and Yahoo do not benefit from expanding usage of the open web in the same way as Google. Tr. 4266:15-67:9, 4365:15-66:3 (Murphy) ("Google has improved the search engines used by other browsers, even browsers like Edge that promote their own search engines. That is, Google's interests in the open web and broad growth in search are such that they found it in their interest to support browsing and searching beyond what they get."); RDXD-33.035.

311. Even companies like Microsoft and Samsung contribute only single-digit percentages to Chromium's development, despite having significant resources and popular Chromium-based browsers. Tr. 1691:6-92:1 (Tabriz); PXR0385* at -020. Other companies that use Chromium in their products "have different business models" and thus do not have "the same incentive or the same mission and vision for the web," as compared to Google. Tr. 1692:5-93:2 (Tabriz).

312. There is no clear source of investment that would replace Google's investment in Chromium. Tr. 1687:22-88:13 (Tabriz). The recent announcement of Supporters of Chromium-Based Browsers, in partnership with the Linux Foundation, is an initiative to offer some financial support to people around the world, including independent developers, who contribute to Chromium. Tr. 1665:20-66:7 (Tabriz); PXR0385*. The Supporters of Chromium-Based Browsers fund is on the order of single-digit millions of dollars, and does not replace the hundreds of millions of dollars that Google invests in the Chromium project annually. Tr. 1694:19-1695:1 (Tabriz); *see* Tr. 2469:12-70:1 (Pichai); PXR0385* at -021 (noting that Google "remain[s] committed to being the responsible steward of the Chromium project and to the massive investment necessary to keep Chromium working well for the entire web").

313. Accordingly, third-party Chromium-based browsers and their users would suffer if Chrome is divested. *See* Tr. 4264:1-67:9 (Murphy) (describing diminished incentives and harm to users); RDXD-33.034-.035; Standal (Opera) Dep. Tr. 68:8-69:11, 71:1-73:23. For example, if Google decreased its investment in Chromium because of divestiture, it would be "[redacted] for Opera. Standal (Opera) Dep. Tr. 68:8-69:11.

314. Divesting Chrome would therefore likely degrade or destroy the Chromium open source project, which would harm consumer welfare. *See supra* ¶¶ 303-313.

4. Divesting Chrome Would Degrade or Destroy ChromeOS, Chrome Enterprise, and the Chrome Web Store.

315. ***ChromeOS.*** ChromeOS is an operating system designed for fast, secure, low-cost laptop computers (often called "Chromebooks") developed by Google that are popular in schools. Tr. 3892:5-20 (Samat); Tr. 1588:11-24 (Mickens); Tr. 2555:12-57:12 (Nieh); RDX0027* at .003, .010; RDX0112* at .015 (noting that ChromeOS's secure-by-design structure, combined with automatic and seamless updates, "has allowed ChromeOS to remain free of viruses and ransomware for over a decade").

316. Plaintiffs' RPFJ does not seek the divestiture of ChromeOS, which is presently organized within Google's Platforms & Devices PA as part of the Android Ecosystem—however, ChromeOS depends on Chrome and is tightly integrated with Chrome. RDX0705* at .012; PXR0162 at -862; Tr. 2554:12-57:12 (Nieh); Tr. 3892:5-20 (Samat); Tr. 1595:11-96:3 (Mickens) (describing current relationship between Chrome and ChromeOS as "deep entanglement"). Critically, Chrome provides the user interface for ChromeOS (i.e., the software that renders graphics on the screen and windows, etc. with which the user interacts). Tr. 2610:2-11:23 (Nieh); RDXD-17.031-.032; PXR0317 at -420; PXR0712* at -122-124 ("ChromeOS is written around Chrome"; "Chrome and ChromeOS share a codebase").

317. The ChromeOS team also relies on the Chrome team for code, feature development, bug fixes, and pre-release testing to make sure that each new release of Chrome does not break ChromeOS running on users' devices around the world. Tr. 2611:24-12:8 (Nieh); Tr. 3892:5-20 (Samat); PXR0712* at -122-124 ("Any time a Chrome engineer commits a change, a whole set of tests are run against ChromeOS" on a "warehouses full of laptops" to "[m]ake sure a given Chrome change doesn't break any one of those devices" because "one tiny Chrome change could break everything[.]").

318. Google's previous attempt to disentangle Chrome and ChromeOS ("Project Lacros") failed after three or four years. Tr. 2610:2-11:23 (Nieh); PXR0712* at -127-129.

319. Divestiture would degrade ChromeOS to such an extent that ChromeOS may not survive or be viable. Tr. 2554:12-57:12, 2611:24-12:8 (Nieh); Tr. 3891:8-92:20 (Samat); PXR0712* at -129 ("[B]est case scenario is keep ChromeOS in stasis, can't update [Chromebooks]. They become insecure since they aren't updated anymore. Would have to explain that to users, schools, enterprises"; "Students would be impacted the most: security vulnerabilities, bugs, random things breaking.").

320. Google is currently working on a project to update ChromeOS to be built in part on the Android operating system ("Project Aluminium"), but a commercially available product will not be released for years. Tr. 2612:9-13:24 (Nieh); Tr. 3989:25-90:2 (Samat); PXR0317 at -426 ("fastest path" to market estimates initial availability to commercial trusted testers in late 2026 and full release, including to enterprise and education sectors, in 2028); PXR0712* at -128.

321. Even when the new OS that runs Chromebooks becomes available, it will not be compatible with all existing Chromebook hardware, requiring Google to maintain existing ChromeOS at least through 2033 to meet its "10 year support commitment" to existing users. PXR0317 at -427; Tr. 2612:9-13:24 (Nieh); Tr. 3891:8-92:20 (Samat); Tr. 1597:1-3 (Mickens); RDX0112* at .015; PXR0712* at -128 ("timeline to phase out ChromeOS is 2034," which is in part "regulation-imposed" because "jurisdictions have various rules for how long a device must be supported"), -131 ("ChromeOS can run on low-end hardware . . . . limits what ChromeOS users can migrate to Aluminium.").

322. ***Chrome Enterprise.*** Chrome Enterprise is a version of Chrome that offers additional functionality for organizational use, including IT administration controls. *See supra*

¶ 239. The Chrome team works with teams in Google Cloud to provide the talent, infrastructure, and technology that make it possible to provide Chrome Enterprise, including advanced security features in Chrome Enterprise Premium. Tr. 1681:12-25 (Tabriz); Tr. 2554:12-57:12 (Nieh).

323. Many customers choose Chrome Enterprise because it comes with Google security, and because Google has invested in Enterprise applications and infrastructure. Tr. 1687:8-21 (Tabriz); RDX0071* at .137 (e.g., Safe Browsing Web Risk protection offered to Enterprise clients).

324. If Chrome were divested, neither Google nor the divestiture buyer would be able to offer an equivalent version of Chrome Enterprise, because Chrome Enterprise requires features provided by Google Cloud. Tr. 1687:8-21 (Tabriz); Tr. 2556:14-24 (Nieh).

325. ***Chrome Web Store.*** Third-party Chrome extension developers build and publish extensions to the Chrome Web Store for "essentially free." Tr. 1648:16-24, 1649:21-23, 1650:4-6 (Tabriz). Chrome extensions allow users to customize their browser and make it "more purpose-built for what [they] specifically use it for" and "work on any Chromium browser." Tr. 1649:3-23 (Tabriz); RDX0021* at .027.

326. Chrome divestiture would degrade the Chrome Web Store because it depends on Google for critical functionality, including Google technology that scans extensions for malicious content to protect users. Tr. 2554:12-14, 2556:25-57:12 (Nieh); RDX0070* at .003.

327. Divesting Chrome would therefore likely degrade or destroy ChromeOS, Chrome Enterprise, and the Chrome Web Store, which would harm browser competition and consumer welfare. *See supra* ¶¶ 315-326.

E. Chrome Divestiture Would Destroy Value and Undermine Incentives.

328. Chrome does not generate any meaningful direct revenue for Google, because Chrome is provided to users for free (except for a small proportion of paid Chrome Enterprise Premium users). Tr. 1603:21-04:13 (Tabriz); Tr. 2664:16-19 (Zenner (Google Expert)).

329. Users access Google products while using Chrome, and as a result some indirect revenues to Google products "flow through" Chrome. Tr. 1605:6-13 (Tabriz) ("Google makes money because people use the web. Chrome is a web browser. And by using the web, browsing the web, using Google's web applications, Google makes money, and that happens -- that revenue flows through Chrome."). Chrome creates incremental value to Google because Chrome "make[s] the web faster," which, in turn, leads to "more people us[ing] the web" leading to more Google income. Tr. 1612:25-13:18 (Tabriz).

330. Another party would not have the same incentives as Google to invest in Chrome and Chromium. Tr. 4264:1-67:9 (Murphy) (describing Google's investment incentives and comparing rivals' incentives); RDXD-33.035-.036.

331. The indirect revenue flowing through Chrome is generated by Google's advertising products, which means that "a new owner of Chrome almost certainly will not achieve the same level of monetization as Google." Tr. 2049:16-23 (Locala (Plaintiff Expert)).

332. The divested Chrome entity would not benefit from the revenue synergies that Chrome has with Google, so a buyer of Chrome would need to develop a new revenue model, which is inherently risky. Tr. 2665:9-17, 2666:7-18, 2667:14-2668:6 (Zenner).

333. Potential buyers like OpenAI, Perplexity, DuckDuckGo, and Yahoo would not be able to monetize Chrome to the same extent that Google does. Tr. 2689:10-90:15 (Zenner).

334. A new owner of the divested Chrome entity would likely also have higher costs than Google, as Chrome would no longer be able to take advantage of existing synergies with

Google's research and development work, technical infrastructure, or administrative resources, for example. Tr. 2670:7-24 (Zenner).

335. The proposed Chrome divestiture would be a forced divestiture, which tends to lead to value destruction. Tr. 2671:25-72:20 (Zenner).

336. User attrition (i.e., users abandoning Chrome) is a significant risk of Chrome divestiture. Tr. 2044:4-23 (Locala). Plaintiffs' experts did not analyze how many users would abandon Chrome if it is separated from Google. Tr. 2044:4-23 (Locala); Tr. 2291:19-24 (Chipty).

337. Google Chrome is an atypical asset for a divestiture, as it is deeply integrated into Google. Tr. 2671:12-20, 2679:5-21 (Zenner). Unlike certain other Google divestitures, Chrome is not a separate business that Google had acquired and never fully integrated. Tr. 2669:14-70:2, 2684:19-85:14 (Zenner); Tr. 1599:25-600:2 (Tabriz).

338. Divesting Chrome would be costly due to various direct costs, such as legal, advisory, consulting, and tax costs, and indirect costs, such as organizational and engineering time and focus and the reduced incentive for Google to invest in Chrome during the pendency of the divestiture. Tr. 2685:18-86:7 (Zenner).

339. For these reasons, *see supra* ¶¶ 328-338, a divestiture of Chrome would be value destructive. The purchase price that Google would receive for Chrome would be substantially less than the value that Google derives from owning Chrome, or, in other words, Chrome is worth more to Google than it would be to a new owner. Tr. 2694:2-13 (Zenner).

F. The Chrome Divestiture Provision Fails to Adequately Define the Scope of Divestiture.

340. Under Plaintiffs' proposal, "Google must promptly and fully divest Chrome, along with any assets or services necessary to successfully complete the divestiture." Pls.' RPFJ § V.A.

341. The RPFJ's definition of "Chrome" is vague—the Technical Committee would be involved in the determination of which "code, software, applications, APIs, and other products and services provided by Google . . . are critical . . . to the full and proper functioning of Chromium or the Chrome browser." Pls.' RPFJ § III.F. The assets to be divested would be "informed by the views of the Technical Committee." Pls.' RPFJ § III.F.

342. The RPFJ provides insufficient detail about the scope of the divestiture. Tr. 2674:1-25 (Zenner). According to Plaintiffs' computer science expert, it is "to be determined" in the future what Chrome code would be divested. Tr. 1586:14-87:11 (Mickens).

343. The full scope of a Chrome divestiture also would not be determined until the buyer decides what they want to do with Chrome. Tr. 1586:14-87:17 (Mickens) ("[T]here will be big differences . . . between what Yahoo as a buyer of Chrome might want out of Chrome versus what OpenAI . . . might want out of Chrome."); Tr. 2062:7-63:2 (Locala) (if prospective buyers come back and ask for additional assets, the Technical Committee "would have to help adjudicate that").

344. The RPFJ places constraints on potential buyers and requires the involvement of third-parties. Tr. 2676:9-77:13 (Zenner). It provides that the buyer must be "approved by the Plaintiffs in their sole discretion," and that the "evaluation of any potential buyer shall include the potential buyer's proposed business and investment plans (including those for open-source project Chromium), the United States' evaluation, at its sole discretion, of any potential risks to

national security, the potential buyer's plans for sharing and protecting user data included in the acquisition, and any other issues a potential buyer may present." Pls.' RPFJ § V.A.

345. Plaintiffs' RPFJ would therefore lead to an atypically slow divestiture process. Tr. 2677:24-78:22 (Zenner). This would lead to increased costs and fees, more and longer distraction for the management team, and a longer period of time wherein Google will be disincentivized to invest in development of Chrome, as well as uncertainty for potential buyers, leading to loss of value. Tr. 2677:24-78:22, 2679:23-80:23 (Zenner).

IV. THE CONTINGENT ANDROID DIVESTITURE WOULD DISCOURAGE INVESTMENT AND DIMINISH QUALITY ACROSS THE ECOSYSTEM.

346. The RPFJ's "Contingent Structural Relief" provision requires that "Google shall divest Android" if certain conditions are met, including if "either or both monopolized markets have not experienced a substantial increase in competition." Pls.' RPFJ § V.C.

347. Plaintiffs define Android to include the Android Open Source Project, Google Play, and Google Play Services, as well as all "code, software, applications, APIs, and other products and services provided by Google that are critical, as informed by the views of the Technical Committee, to the full and proper functioning" of those products. Pls.' RPFJ § III.B.

348. Plaintiffs "do not believe the Android divestiture option would apply" to a variety of products that are part of Google's Android Ecosystem, including WearOS, Android XR, Android Auto, Android TV, and ChromeOS, although Plaintiffs "take no position on 'how Google would be able to continue to offer these products.'" RDX0705* at .014.

349. Plaintiffs' Android divestiture proposal would apply worldwide—it would not, and could not, be limited to application in the United States. RDX0705* at .006.

350. Plaintiffs have not alleged, and no witness testified, that there was anything unlawful about Google's development and maintenance of Android, Google Play, or Google Play Services. *See, e.g.*, Tr. 2303:18-04:9 (Chipty (Plaintiff Expert)).

351. Plaintiffs' experts did not offer any opinions about the contingent Android divestiture proposal. *See, e.g.*, Tr. 2129:6-9 (Chipty); Tr. 1562:7-10 (Mickens (Plaintiff Expert)); Tr. 2039:14-16 (Locala (Plaintiff Expert)).

352. In fact, in the view of Plaintiffs' economics expert Dr. Chipty, the contingent Android divestiture proposal "seemed to go too far." Tr. 2201:1-7 (Chipty).

A. Android's Success Is the Product of Google's Investment and Innovation.

353. Google acquired Android in 2005. Tr. 3887:20-88:5 (Samat (Google)). At that time, it was a small company, and it would take three years for Google to build Android to the point where it could be launched on a phone. Tr. 3887:20-88:13 (Samat).

354. In 2008, Google released Android as we know it today: "an open-source operating system" that "allows third-party developers to create new smart devices and technologies by customizing the Android system to the device or technology." Liability Op. FOF ¶ 5; Tr. 3887:20-88:5 (Samat).

1. The Open-Source Android Ecosystem Is Important.

355. Many advancements in mobile technology originated on Android. The Android Ecosystem spawned the first foldable phones and the first smartphones with large screens, and Android was first to develop different form factors, including watches, tablets, and internet-connected televisions. Tr. 3898:8-99:3 (Samat).

356. The Android Ecosystem also has facilitated the existence of affordable smartphones to compete against Apple devices. Tr. 3897:3-98:7 (Samat); Liability Tr. 7652:1-22 (Pichai) (noting that charging no license fee for Android has "allowed OEMs to customize

and meet the needs of people around the world, including building affordable smartphones"); *see also* PXR0196* at -837.

357. Today Android is an ecosystem that powers over 20,000 device models, from hundreds of manufacturers, across numerous form factors (including mobile phones, tablets, wearables, and TVs), worldwide. Tr. 3874:16-75:5, 3881:9-12 (Samat); RDX0112* at .016; RDX0028* at .021. Android has billions of users around the world, and "[t]here are over 3 billion active Android devices in the world today." Tr. 3881:9-17 (Samat).

358. Many companies use open-source Android code to power their devices without any contractual relationship with Google—for example, Peloton powers its exercise bikes with Android, and American Airlines powers its inflight entertainment system with Android. Tr. 3876:20-77:10 (Samat); RDXD-30.002.

359. Android was created with the goal of promoting competition in the marketplace for mobile devices, and to assure an open platform for Google and third party developers on mobile devices. Tr. 4002:22-03:19 (Samat); Tr. 2471:4-74:2 (Pichai (Google)) (describing Android's competitive efforts against "most popular product in the marketplace . . . Apple's iPhone"); Liability Tr. 7652:1-22 (Pichai) ("[Q.] Does the Android operating system also advance Google's mission of organizing the world's information and making it universally accessible and useful? A. Just like Chrome, Android was designed to be a free open operating system . . . . [W]e felt the best model was to build a world-class operating system and make it open source, and make it free for OEMs to use and adopt which facilitated both adoption of the product, as well as allowed OEMs to customize and meet the needs of people around the world, including building affordable smartphones, which I think was key to reaching as many people as possible.").

360. In fact, "Android is one of the most open operating systems that's ever been created," in terms of the ability to "switch out services" and "build services that access more of the device." Tr. 4007:25-08:13 (Samat). The Android platform is more open than Windows, and the iOS platform is becoming more open based on the model of Android. Tr. 4007:25-08:16 (Samat).

361. Over a million developers, a large number of whom are located outside the United States, build businesses based on the Android platform. RDX0028* at .007, .011. Developers rely on Google to secure their intellectual property, combat fraud, and prevent abuse on the Android platform, as well as to automatically optimize their apps across device models and form factors. RDX0028* at .019, .021.

2. Google Play and Google Play Services Provide Important Functionality on Android Devices.

362. Google Play and Google Play Services, both proprietary services offered by Google apart from open-source Android OS, provide important services and functionality on a variety of Android devices. Tr. 3877:15-81:8 (Samat); RDXD030.002.

363. Google Play allows users and developers to transact for app purchases on Android devices. Tr. 3880:15-22 (Samat); RDX0028* at .002. Google Play has more than 3 billion monthly active users and a catalog of 3.4 million titles (i.e., apps, games, etc.). RDX0028* at .005, .011. It delivers 600 million installs every day. RDX0028* at .012, .014.

364. Importantly, Google screens applications on Google Play to make sure that they are not malicious. Tr. 3880:15-22 (Samat); RDX0028* at .014; RDX0127* at .003 (describing review process to help prevent harmful apps from becoming available on Google Play).

365. In addition to providing a platform for app transactions, Google Play also delivers important system updates, such as security updates, to Android devices. Tr. 3880:23-81:8

(Samat); RDX0028* at .012. Google Play's global distribution system also delivers 5 billion app updates every day. RDX0028* at .012.

366. Google Play Services is a product built by Google and composed of many dozens of software modules that provide proprietary Google services from Google servers to Android devices. Tr. 3877:15-24 (Samat); RDX0010* at .001 ("Externally, GMSCore is known as Google Play Services."); RDX0054* (listing modules). Most of these modules are built by teams outside of the Android product group. *See* RDX0054*.

367. While Google Play Services provides APIs, the work to provide the software functionality is done by Google backend servers. Tr. 3877:15-24 (Samat); RDXD-30.004.

368. One example of a Google feature provided to Android via Google Play Services is Google's Integrity API, an anti-abuse platform that protects apps on Android from abuse. Tr. 3878:1-20 (Samat). The Integrity API ensures that an Android device is a real, untampered device, and not an emulator. Tr. 3878:1-20 (Samat). Many apps, including banking apps, rely on this API, and the system that powers this API runs on Google's backend servers. Tr. 3878:21-79:7 (Samat).

369. Another example of a Google feature provided to Android via Google Play Services is Google's Location API. Tr. 3879:8-80:3 (Samat). This functionality allows Android to translate GPS longitude and latitude coordinates into physical places, which enables critical functionality for numerous applications, including ride-share applications. Tr. 3879:8-80:3 (Samat).

370. Even beyond Android smartphones and tablets, other Android Ecosystem products rely on Google Play's servers for basic functionality and security. RDX0028* at .046

("Over 4 billion devices connect to Play's servers daily to do updates & malware scanning including phones, tablets, cars, watches, TVs, [C]hromebooks, and more[.]").

3. Google Has Continually Invested in Android, Google Play, and Google Play Services.

371. Google spends billions of dollars per year to develop Android, and has invested over $30 billion in the Android Ecosystem in the past three years. Tr. 3888:14-21 (Samat).

372. Every new version of Android introduces new security and privacy features. RDX0127* at .004. For example, Android has developed features "that alert a user to suspicious activity that could be related to potential intrusions on their device." RDX0112* at .023.

373. Android has heavily invested in security update infrastructure, including building and maintaining tooling to detect missing security patches on Android devices, scaling security updates across a broad range of hardware products at varying price points to make it easier and more cost-effective for device manufacturers to update software, and developing technology to make major Android components updateable by Google itself. Tr. 3880:23-81:8 (Samat). RDX0112* at .016.

374. As for Google Play, Google launches hundreds of major user and developer features and foundational improvements to trust, safety, and quality every year. RDX0028* at .025 (listing exemplar feature launches). For example, Google Play Protect is a built-in anti-malware solution that runs on over three billion Google Mobile Services-enabled devices and alerts users to potential threats through a combination of on-device app scanning and cloud-based backend infrastructure. RDX0112* at .023.

375. Google has also innovated to bring AI features to mobile devices. Tr. 3958:1-59:18 (Samat). For example, Google recently introduced the "Circle to Search" feature on Android devices. Tr. 3978:22-79:4 (Samat).

B. Android Relies on Google for a Wide Variety of Administrative, Technical, and Cybersecurity Functions.

376. Android does not operate as a stand-alone business, and has a variety of dependencies on Google. Tr. 3881:20-82:9, 3883:25-84:14 (Samat).

377. The Android Ecosystem is a team organized within Google's Platforms and Devices (P&D) product area. Tr. 3882:3-9 (Samat). The "Android Ecosystem" comprises numerous "verticals," and includes the Android Open Source Project, Google Play, and Google Play Services, as well as Android TV, Android Auto, Wear OS (i.e., for Android watches), and Android XR (i.e., for virtual reality headsets). Tr. 3874:16-75:5 (Samat). Nearly 13,000 employees work within the Android Ecosystem, across verticals. Tr. 3882:10-12 (Samat).

378. Teams within the Android Ecosystem rely on Google for a variety of shared functions, including finance, human resources, and legal. Tr. 3883:25-84:14, 3994:12-19 (Samat). Android also relies on centralized Google Security and Trust and Safety teams, as well as on Google's secure infrastructure and security testing programs. Tr. 3883:25-84:14, 3888:22-91:7 (Samat); Tr. 2343:21-44:13 (H. Adkins (Google)).

379. The Android Ecosystem also has cross dependencies across Android verticals, including because Android is developed via "trunk stable development": Every team working on an Android vertical works on the same trunk, or base of code, and commits code back to that trunk. Tr. 3883:1-19 (Samat).

380. Android and Play have complex dependencies on Google's bespoke technical infrastructure, and that infrastructure is designed and optimized for speed, reliability, and security. Tr. 2515:22-17:22 (Nieh (Google Expert)); Tr. 3884:20-87:19 (Samat).

381. Android relies on Google's provision of services, including Google Accounts and Parental Controls. Tr. 3884:20-85:24 (Samat). The infrastructure that manages Google

Accounts, and that allows Google to set and manage parental controls, is centralized at Google, and is not part of the Android team. Tr. 3884:20-85:24 (Samat).

382. Although users might be familiar with Google Play as an Android application on their devices, the functionality of that app is provided by tens of millions of lines of code running on Google backend servers, within a complex web of server interdependencies. Tr. 2617:21-19:7 (Nieh); RDXD-17.036; RDX0008 at .001.

383. Android and Google Play depend on many Google systems, including, but not limited to, Google Front End, Global Service Load Balancer, Borg, Colossus, Spanner, Bigtable, Kansas, and GAIA—all of which themselves have complex interdependencies on other Google systems. Tr. 2515:22-17:22, 2619:8-20 (Nieh); RDXD-17.036-.037.

384. Android and Google Play features that will not work without connection to Google backend servers include sign-in to Google Accounts, At a Glance, Gemini in Google Messages, Find My Device, Google Play Protect, downloading apps from Google Play, Android location settings, and Trusted Places. Tr. 2619:21-20:15 (Nieh); RDXD-17.038; *see also* RDX0028* at .024 ("Due to the OS functionality [Google Play] provide[s], if the Play Store or Google Play Services fail, an Android device can become unusable and require a factory reset. We mitigate with rigorous monitoring, and ensuring multiple layers of contingency plans are in place.").

385. Google Play also depends on "foundational payments and ads infrastructure that Play leverages in the normal course of business." RDX0028* at .005.

C. Divesting Android Would Pose Immeasurable Challenges.

386. Divesting Android and Google Play would be highly challenging because of their many dependencies on shared Google services, and on Google backend systems, for functionality. *Supra* § IV.B; Tr. 2515:22-17:22 (Nieh); Tr. 3888:22-91:7 (Samat); *see also*

Tr. 1562:7-10 (Mickens) (acknowledging that he is not offering any opinions in this case about the technical feasibility of Android or Play divestiture).

387. It would be infeasible to separate Google Play from Google in a way that maintained the same level of security, which is one of Google Play's primary values to consumers. Tr. 3888:22-91:7 (Samat).

388. Another challenge of an Android/Google Play divestiture would be the need for the asset buyer to acquire licenses to operate in the 190 countries where Google Play currently operates. Tr. 3888:22-91:7 (Samat). If divested, Google Play would lose access to Google's licenses to operate in those countries. Tr. 3888:22-91:7 (Samat).

389. Divesting Android/Google Play also would be highly complicated; and as a result, any divestiture would have uncertain timelines and entail an unknown probability of success. Tr. 2515:22-17:22 (Nieh). Even if the divested Android and Google Play were less than fully functional, divestiture would likely take more than five years. Tr. 2617:5-20 (Nieh).

D. Both the Contingent Possibility of Android Divestiture and Any Actual Android Divestiture Would Cause Widespread Harm.

390. Putting a cloud over the Android Ecosystem through a potential future divestiture would put Android in "an extremely challenging position." Tr. 4006:15-07:3 (Samat).

391. The threat of future divestiture may cause current Google partners and Android developers to move away from the Android Ecosystem because of the business uncertainty of continuing to develop a business around Android. Tr. 4006:15-07:3 (Samat); Tr. 4268:24-69:25 (Murphy (Google Expert)); RDXD-33.038 ("The uncertainty created by Plaintiffs' proposal will itself depress Android investments[.]").

392. If there were no Android, there would only be one predominant mobile operating system—Apple iOS—in the United States. Tr. 4002:22-03:5 (Samat); *see supra* ¶¶ 122-123.

393. A different owner of Android would not have the same incentives and capabilities as Google to invest in Android and expand usage of Android. Tr. 4268:24-69:25 (Murphy); RDXD-33.038 ("Another party would not have similar incentives to expand usage of Android"); Kim (Samsung) Dep. Tr. 50:19-52:10 ("Google has been investing heavily to make Android OS competitive and stay ahead and continue to innovate;" if Android were controlled by a different entity, "I don't know if the entity . . . will have . . . expertise and resources and willingness to actually continue to provide this as a[n] open ecosystem and also . . . bring the latest sort of technology into the devices. And I think that will slow down."); Boulben (Verizon) Dep. Tr. 132:6-33:4 (explaining that only Google and Samsung could "be an owner and developer of Android," and "Google has better software capabilities to continue and evolve it").

394. Google's ownership of Android prevents forking and fragmentation, which would harm the ecosystem. Boulben (Verizon) Dep. Tr. 132:6-34:7 ("[T]he Chinese ecosystem has forked," creating "a Chinese version of Android that has evolved differently," and the resulting fragmentation "has reduced [Android's] share of the total market."); Tr. 2472:23-74:2 (Pichai) ("We somehow have to make sure, from a Samsung phone to a Motorola phone, all these messaging services, when people buy it, it kind of works out of the gate. That's an area where we didn't take an active role, and it's gotten very fragmented."); Kim (Samsung) Dep. Tr. 52:11-53:12 ("[I]f there's nobody who is actually . . . managing the overall ecosystem for the Android . . . world, then you'll have . . . Samsung with Android[,] . . . Pixel with Android[,] . . . Xiaomi with Android, and they will have a separate ecosystem which will fragment the developers to develop . . . services on the devices. . . . [T]o maintain Android . . . as a . . . fragmented ecosystem will just increase the cost to manage.").

395. Divesting Android would break the currently vibrant Android Ecosystem of phones, watches, tablets, TVs, and augmented reality headsets, hampering Android's ability to compete with Apple. Tr. 3891:8-92:4 (Samat); Tr. 2471:4-72:22 (Pichai); *see* RDX0705* at .014 (Plaintiffs stating that divestiture would not apply to the other form factors in the Android Ecosystem—including Wear OS, Android XR, Android Auto, and Android TV—but taking no position on how Google could continue to offer them).

396. As with Chrome, divesting Android would put the cybersecurity of the Android Ecosystem and its users at risk. Tr. 2343:21-44:13 (H. Adkins). Android and Google Play demand a very high level of security, and would lose the protections of Google's multi-layered security infrastructure. Tr. 2343:21-44:13 (H. Adkins).

397. As with Chrome, Android's divestiture would be value-destructive, due to the large size of the divestiture, and Android's extensive integrations. Tr. 2692:15-93:11 (Zenner (Google Expert)) ("I believe the proposed divestiture would be value destructive on the side of operating the business[;] it would be lower revenue, higher cost and uncertain revenue; so that's one negative. And then it would also be a very costly transaction to [e]ffect."), 2680:20-23 (Zenner) (noting that with the divestiture of Android, as with Chrome, "more complexity, is more time, very atypical transaction, all of that would lead to value destruction").

398. Threatened divestiture of Android would reduce Google's incentives to invest in Android going forward. Tr. 4268:24-69:25 (Murphy) ("[Conditional Android divestiture] would reduce Google's investment incentives because it's no longer clear that they will continue to have Android in the future . . . . if [Google] improve[s] [Android] and the rivals don't gain much share, we might come back and divest Android, and that's an adverse incentive").

399. Weakening the Android Ecosystem—whether through divestiture or through the decreased incentives in a world with a threatened divestiture—would harm consumers, developers, and Android carriers and OEMs by weakening competition against the iOS ecosystem. Boulben (Verizon) Dep. Tr. 73:13-74:6 ("So, fundamentally, we want consumer choice on the ecosystem, so we want at least two vibrant ecosystems."); *see* Tr. 4268:24-69:25 (Murphy); RDXD-33.038 ("Google has strong procompetitive incentives to invest in Android[.] Android has fostered differentiation and price competition against iOS[.]")); Tr. 4006:15-07:3 (Samat); *see also supra* § II.B.1.

E. The Android Contingent Divestiture Proposal Fails to Clearly Define the Scope of Divestiture.

400. Under Plaintiffs' proposal, "[i]n the event the remedies in this Final Judgment prove insufficient to serve their intended purposes of restoring competition or if Google attempts to or is successful in circumventing these remedies, then the Court may impose additional structural relief, including the divestiture of Android." Pls.' RPFJ § V.C.

401. The RPFJ's definition of "Android" is vague—the Technical Committee would be involved in the determination of which "code, software, applications, APIs, and other products and services provided by Google . . . are critical . . . to the full and proper functioning of an Android Device." Pls.' RPFJ § III.B. The assets to be divested would be "informed by the views of the Technical Committee." Pls.' RPFJ § III.B.

402. The RPFJ's trigger for contingent divestiture is also vague—Android divestiture would be triggered by a showing that, after "at least five (5) years," "either or both monopolized markets have not experienced a substantial increase in competition"—without definition of what "substantial increase in competition" means, how it would be determined, and by whom. Pls.' RPFJ § V.C. Android divestiture could also be triggered "if Google attempts to or is successful

in circumventing these remedies"—without further explanation, which is particularly vague as to what might constitute "attempted" circumvention. Pls.' RPFJ § V.C.

V. THE COMPELLED DATA DISCLOSURE AND SYNDICATION PROVISIONS WOULD CONFISCATE GOOGLE'S PROPRIETARY ASSETS AND TECHNOLOGIES WHILE HARMING INNOVATION, COMPETITION, AND SEARCH USERS.

A. The Unrebutted Evidence Confirms That Plaintiffs' Compelled Disclosures Would Divest Google of Its Proprietary Assets and Intellectual Property, to the Detriment of Competition, Innovation, and Search Users.

1. The Evidence of IP Loss to Google Stands Uncontroverted.

403. Google has invested enormous sums and innovated for decades to develop and improve its web crawl index, vertical indexes, and Knowledge Graph, as well as the query understanding and ranking technologies used to retrieve and serve that information to users. *See infra* §§ V.A.2, B.1-2, C.1, E.2.

404. Mr. Pichai summarized the devastating impact Plaintiffs' data disclosure proposals would have on Google's ability to continue its tradition of investing in these innovative technologies and data sources. By requiring Google to turn over, at marginal cost, the "full end to end [of] all the years of R&D and innovation [Google has] put into the product," Plaintiffs' proposal amounts to a "de facto divestiture of the entire IP related to Search." Tr. 2464:20-65:35 (Pichai (Google)). Rivals could "completely reverse engineer every aspect of [Google's] technology stack," such that Google would be left with no clear path forward for "fund[ing] all the innovation" and "generat[ing] a return on investment." Tr. 2464:20-65:35 (Pichai).

405. Plaintiffs' extensive syndication regime would likewise compel disclosure of tremendous amounts of Google's intellectual property and enable the reverse engineering of Google's technologies: Google would have to furnish rivals on an ongoing basis with its best-in-

class query understanding, ranked web results and FastSearch results, search features, and SERP layout technologies, all of which reflect Google's years-long and ongoing innovation efforts. *See infra* §§ V.A.2, E; *see also* Tr. 3433:16-34:19 (Reid (Google)).

406. The syndication proposals would negatively impact Google's ability to continue to innovate at the pace and caliber its users expect. Tr. 3488:22-89:24, 3507:19-08:13, 3533:17-34:16 (Reid).

407. As Mr. Pichai explained, "[I]t's not clear to me how we would have any value for our IP if we were to share our entire IP at marginal cost." Tr. 2470:10-25 (Pichai).

408. The forced disclosures under Plaintiffs' search index, user-side data, ads data, and syndication proposals include the Google technologies involved in each step of the overall search and ads stacks, leaving virtually no Google search innovation undisturbed. Tr. 2784:1-11 (Allan (Google Expert)); Tr. 3432:5-7 (Reid); Tr. 4401:17-04:24 (Muralidharan (Google)); RDXD-20.007; RDXD-28.002; RDXD-34.003; *see infra* §§ V.B-F.

409. Taken together, the forced data disclosure and syndication proposals would have a substantial, negative impact on Google's ability to innovate and invest in search and ads in the future. Tr. 2470:10-25 (Pichai) ("[A] combination of all the remedies, I think, makes it unviable to invest in the R & D the way we have for the past two decades to continue to innovate and build Google Search, and so I think it definitely will have many unintended consequences."); Tr. 3534:11-35:13 (Reid) ("[I]f you take places in which we can't differentiate because whatever we do can essentially be copied or directly shared . . . then our incentives will be to look to different places to differentiate and so we'll focus on parts that are . . . less covered by the remedies because that's where we can stand out."); Tr. 4452:23-53:8 (Muralidharan) ("I'm going to invest differently in what I work on if I'm improving Google versus I'm improving Google

and anybody who chooses to copy Google. . . . [I]t would definitely slow down the pace [of innovation] there."); *see also* Tr. 4246:9-48:11, 4257:21-59:20 (Murphy (Google Expert)) (explaining how Plaintiffs' proposals harm innovation).

410. Google executives and Google's outside computer scientist expert testified at length to the widespread loss of Google's intellectual property that would result from Plaintiffs' proposals, and *Plaintiffs neither cross-examined those witnesses on that topic nor submitted any other contrary evidence*. Tr. 3432:5-17, 3527:8-32:8 (Reid); Tr. 2464:20-65:25 (Pichai); Tr. 4452:2-53:4 (Muralidharan); Tr. 2780:23-81:15, 2817:13-19:18 (Allan).[6]

411. As detailed below, in Section V.A.5, Plaintiffs offered no economic or industry expert testimony supporting their data disclosure and syndication proposals. Their case rests on the testimony of would-be recipients of Google's proprietary assets and intellectual property, who unsurprisingly are eager to receive such a handout.

2. Google's Proprietary Technologies Are the Product of Its Investments and Innovation.

412. Google's superior product quality rests in part on its numerous innovations over the years. Liability Op. FOF ¶ 128.

413. Some of the innovations that have set Google apart from its competitors include: "Spell Checking ('Did you mean')," Images, Synonyms, Autocomplete, Maps, Knowledge Graph, Featured Snippets, RankBrain, People Also Ask, Neural Matching, BERT, "Better Understand Misspellings," and MUM. Liability Op. FOF ¶ 128 (citing DXD-37.140).

[6] Notably, neither of Plaintiffs' computer scientist experts opined on the extent of IP loss to Google. Their testimony, rather, was that rivals would require infrastructure and engineers to deploy Google's intellectual property and Google's proprietary assets in their own rival search engines (Professor Mickens) and rivals would not be able to create an exact replica of every functionality of Google Search for every query Google receives (Professor Durrett). Tr. 1546:25-48:22 (Mickens (Plaintiff Expert)); Tr. 193:1-94:10 (Durrett (Plaintiff Expert)).

414. These innovations, in many instances, came only after repeated trial and error over many years. Liability Tr. 8027:1-28:3 (Gomes (Google)); Tr. 3463:10-65:1 (Reid).

415. Google's expert Professor James Allan, for example, described how Google's Knowledge Graph reflects novel approaches to challenges that had for decades stymied even experts in the field of information retrieval. Tr. 2805:7-21, 2806:19-07:8 (Allan).

416. Since the liability trial, and with advancements in generative artificial intelligence, Google has continued to innovate and improve to better meet users' needs. Tr. 3547:5-49:15 (Reid).

417. AI Overviews, AI Mode, and Circle to Search are some of the better-known examples of such recent innovations. Tr. 3550:19-55:16 (Reid).

418. There are many more innovations that Google has yet to launch, especially as generative AI continues to expand what is possible in search. Google is "still at the beginning" with generative AI, which promises to make the parts of Search that users love "more and more possible." Tr. 3556:10-57:7 (Reid). As Ms. Elizabeth Reid, Google's Head of Search, testified, this is "the most exciting time [she has] seen in Search so far." Tr. 3556:10-57:7 (Reid).

419. Much of Google's innovation takes place behind the scenes, in areas users do not see directly. Tr. 3496:21-97:14 (Reid); Tr. 2816:9-20 (Allan).

420. Before Google shows search results to users, it must interpret the intent behind their queries, retrieve relevant information from previously gathered sources (e.g., the web crawl index and vertical feeds), rank what information would be most useful, and then determine which features to display on the page, and in what order. Tr. 3430:21-31:23 (Reid); Tr. 2782:5-83:25 (Allan); RDXD-20.007; RDXD-28.002.

421. Ms. Reid testified to the decades of effort undertaken and the many billions of dollars spent to develop and maintain Google's Search assets and technologies. Tr. 3428:11-30:6, 3436:8-44:6, 3446:14-78:7 (Reid).

422. Several hundred engineers at Google work on the query understanding step alone. Tr. 3498:13-17 (Reid).

423. Several hundred Google engineers work on the crawling, analyzing, and indexing stages of building Google's web crawl index; thousands work on Google's vertical units, indexes, and ranking; and approximately one thousand more work on data feeds and pipelines for the Knowledge Graph. Collectively, Google has invested tens of billions of dollars into the features and underlying data feeds it would be required to disclose and/or syndicate to competitors under Plaintiffs' index and syndication proposals. *See infra* §§ V.B.1-2, E.2-3.

424. "Close to a thousand" engineers work on Google's ranking signals. Tr. 3465:2-4, 3463:10-65:1 (Reid).

425. Questions of when to trigger feature units, how to order them on a page, and what information to display and where to display it within each feature are not "straightforward problem[s]," and in fact implicate myriad Google technologies. Tr. 2814:25-15:22 (Allan); Tr. 3490:1-91:3 (Reid).

426. Taken together, Plaintiffs' proposals implicate search systems and processes that draw on the work of more than 10,000 people at Google. Tr. 3431:24-32:21 (Reid).

427. Dr. Muralidharan, a Vice President of Product Management in Google's search ads team, testified that over his fifteen years working on search ads at Google, the team has spent significant time and resources improving the ads systems. These efforts have depended on the

team's energy and insights on how to design systems or create better algorithms. Tr. 4452:2-22 (Muralidharan).

428. Today Google employs thousands of engineers in the ads organization to "constantly improv[e]" ads models by increasing performance and responding to advertisers' feedback. Tr. 4405:2-06:14 (Muralidharan).

3. There Is No Record Basis to Put Rivals on Equal Footing to Google.

429. Antitrust remedies should be limited to restoring competition "to where it would have been without the conduct." Tr. 2206:16-24 (Chipty (Plaintiff Expert)); *see supra* § I. Plaintiffs' compelled data disclosure and syndication proposals wildly miss this target, to the detriment of competition and consumers.

430. Plaintiffs' data disclosure and syndication proposals would place Google's rivals on *equal* footing with Google in terms of Google's user-side data scale and core search and search ads technology. This market transfer of data and assets is unsupported by the record.

431. Numerous factors *other* than the challenged contracts undisputedly contributed to Google's development of the proprietary assets and technologies that would be disclosed by the compelled data disclosure and syndication provisions. Liability Op. at 247 ("Google has not sat still despite its dominant market share. Search has changed dramatically over the last 15 years, largely because of Google. . . . Its SERP, for example, is different today than it was even five years ago. . . . Moreover, the evidence that Google has left innovative technologies on the shelf, or that its investments in R&D and human capital have fallen behind others in the industry, is sparse.").

432. Plaintiffs, for their part, have not shown or even attempted to show that a substantial portion (let alone the entirety) of the search quality gap between Google and rival GSEs is attributable to the challenged agreements. *See supra* § I.A.

433. Since there is no foundation for assuming that rivals would have achieved quality on par with Google's indexes and Google's query understanding, ranking, search feature, and ads technologies, the forced data disclosure and syndication provisions demand far more from Google than merited by the Court's actual findings.

434. But even apart from that fact, Plaintiffs' data disclosure and syndication proposals would create a radical distortion of incentives, to the harm of users. As outlined below, Google presented unrebutted fact and expert testimony outlining the harm to innovation that would be caused by Plaintiffs' proposals. Plaintiffs presented no contrary evidence: Their sole economic expert had no understanding of the details of the data disclosure and syndication proposals and no opinion on whether those provisions "go too far." Tr. 2235:22-36:9 (Chipty).

4. Testimony from Third Parties and Google's Fact and Expert Witnesses Confirms That Plaintiffs' Proposals Would Artificially Prop Up Rivals While Diminishing Incentives of Rivals and Google Alike to Innovate and Invest.

435. Because search engines do not charge users, the primary means to compete is by innovating and improving search quality, i.e., by developing better search products. Tr. 4241:23-43:16 (Murphy (Google Expert)); Tr. 3534:11-35:13 (Reid); Liability Tr. 8200:9-25 (Reid).

436. Plaintiffs' proposals ignore this economic reality and would undermine innovation incentives across the search ecosystem. Tr. 4243:17-44:20 (Murphy) ("[P]laintiffs' remedies . . . prevent Google from competing through innovation by saying, you have to share innovations with others."); Tr. 4254:18-55:21 (Murphy) ("[I]n the sharing process, you're actually harming things on a different dimension, which is the innovation and other incentives.").

437. Google expert economist Professor Kevin Murphy explained that consumers will bear the costs of these disincentives to innovate in the form of worse search products. Tr. 4254:18-55:21 (Murphy).

a. Plaintiffs' Proposals Diminish Google's Incentive to Innovate and Invest, to the Detriment of Users.

438. Google's "north star" when deciding how to devote its resources is determining "the most impactful" ways it can help users. Tr. 3534:11-35:13 (Reid).

439. Google is constantly exploring different ideas for improving user experiences, prioritizing projects that achieve the best user outcomes in order to differentiate Google Search from its rivals. Tr. 3534:11-35:13 (Reid).

440. And Google constantly iterates and fine-tunes its technologies to better meet the needs of its users. Tr. 3487:6-88:21, 3502:11-03:10, 3503:24-04:22, 3505:19-06:25 (Reid).

441. Forcing Google to share its data and technologies or to syndicate its innovations with competitors without restrictions would necessarily reduce Google's incentive to innovate in the future because Google could no longer reap the benefits associated with creating a unique product. Tr. 4246:9-48:11, 4243:17-44:20 (Murphy); *see also* Tr. 3197:14-201:14 (Israel (Google Expert)) (explaining that all firms, including Google, invest to get a competitive advantage, but this incentive evaporates as soon as those investments must be shared with competitors).

442. Plaintiffs' data disclosure and syndication proposals would further curtail Google's ability to innovate by imposing extensive costs that Google would incur to comply with Plaintiffs' RPFJ. Tr. 3532:19-33:25 (Reid); *see infra* § V.E.1.c.

443. The requirement that Google syndicate content "the same as if the Qualified Competitor's query had been submitted through Google.com" would considerably broaden the scope of the work Google would be compelled to do for rivals, compounding these innovation harms. Pls.' RPFJ § VII.A; Tr. 3499:2-500:2 (Reid); *see infra* § V.E.1.a (describing vast differences between Plaintiffs' proposals and Google's current syndication practices).

444. Implementing these proposals would demand reallocation of a substantial percentage of Google's Search team. As Ms. Reid explained, Google would need to dedicate over 20% of its Search workforce (amounting to nearly 2,000 people) to focus on compliance with Plaintiffs' data disclosure and syndication proposals rather than on innovation. Tr. 3532:13-33:25, 3534:1-10 (Reid).

445. Thus, as Professor Murphy testified, forced data disclosure and syndication would weaken Google's current and future ability to meet consumers' demand for information. Consumers would ultimately bear the costs of a less dynamic, less innovative Google. Tr. 4200:9-01:20, 4210:6-11:1 (Murphy) ("[R]educing what Google can do for consumers is a very difficult way to make the world better . . . because the whole goal of competition is to improve things for consumers. . . . [S]aying I'm going to make it harder for Google to satisfy customers' needs, that's particularly pernicious because it's just digging a hole that's going to be very difficult to ever get out.").

446. Marginal cost pricing compounds these harms. Plaintiffs' data disclosure and syndication proposals would require Google to share data with and syndicate to competitors "at marginal cost," which Plaintiffs define as "the direct total production cost of producing an additional unit of a good or service, and here would be determined by calculating the change in direct total production cost resulting from Google from providing the additional unit(s) of services." Pls.' RPFJ §§ VI, VII; RDX0703* at .007.

447. By this measure, marginal cost does not capture the substantial data acquisition, research, experimentation, and implementation costs Google incurs in developing and improving its search and ads technologies, not to mention the loss of Google's intellectual property and the fixed costs incurred to run this extraordinary business. Tr. 3515:24-17:8 (Reid); Liability

Tr. 8229:18-30:12 (Reid); Tr. 2795:19-97:6 (Allan); RDXD-20.020-.021; *see also* Tr. 3201:15-02:3 (Israel) ("[D]eveloping data is mostly fixed cost, not marginal cost.").

448. Overall, Google has committed many times more engineers and other talent to developing its search technologies and the datasets underlying them than its competitors. Tr. 3432:18-21 (Reid) ("There's over 10,000 people involved in different parts of creating [Google's search technologies]"); RDXD-28.002; Tr. 984:3-88:13 (Weinberg (DuckDuckGo)) (in 2018 DuckDuckGo had approximately 40 full-time employees); DX0628 at .005 ("There are only 3-4 [full-time employees ('FTEs')] (8% of total FTE[s]) working on improving the search engine right now. That seems low."); Liability Tr. 2058:21-24 (Weinberg); Tr. 422:2-22 (Turley (OpenAI)) ("low hundreds" of engineers for ChatGPT, including search); Liability Tr. 2752:9-54:4 (Parakhin (Microsoft)) ("[Microsoft's] search team also is a fraction of Google's . . . probably 10% of Google's rate.").

b. Plaintiffs' Proposals Diminish Competitors' Incentives to Innovate and Invest, to the Detriment of Users.

449. Professor Murphy explained that "progress happens through the competitive process." Tr. 4210:8-11:23 (Murphy).

450. The forced disclosure of Google's assets would "interfer[e] in the competitive process." For example, firms "develop[ing] their own index" rather than "us[ing] Google's index" is a key part of the competitive process, ultimately promoting a differentiated market economy and its associated efficiencies. Tr. 4210:6-13:2 (Murphy).

451. Plaintiffs' data disclosure proposals would encourage competitors to copy Google rather than innovate, thereby weakening innovation incentives. Tr. 4257:21-59:20 (Murphy) ("[M]aking it easier to be like Google, I don't think enhances the incentive to be different from Google, because, you know, the more you make it easy to be like Google, the more people are

going to tend to be like Google. The more you make it so that the way to succeed is to be different, the more they're going to be different."); *see also* Tr. 3201:15-03:5 (Israel) ("[T]he competitive process is important, so I worry about remedies that say we're going to hand you Google's data as opposed to saying . . . you have to go out and compete for it."), Tr. 3200:11-01:14 (Israel) (explaining that the Ads Data disclosure proposals create a "free riding problem" that would "reduce the incentive for Google and for other firms to invest in developing these data tools themselves."); Tr. 2234:23-35:3 (Chipty) (Q. "And if you get the—if you get it wrong in terms of disclosing too much data, that can detract from a rival's incentives to innovate and also detract from Google's incentives to innovate, correct?" A. "Yes, I think, in principle, it's possible . . . .").

452. Indeed, rivals with access to Google's technologies would be able to integrate Google's core search and ads technologies directly into their own search engines rather than develop and improve their own search products. *See infra* §§ V.B.1, B.2, C.1, D.3, E.2, F.4.

453. Plaintiffs' syndication proposals further weaken competitors' innovation incentives. Under those proposals, rivals could replicate much of the experience that users get on Google.com, reaping the benefits of years of Google's innovation efforts *and* Google's future innovations. *See infra* §§ V.E.2-3, F.4.

454. Additionally, Plaintiffs ignore the damage their proposals would inflict on existing search and ads syndication businesses. For instance, with respect to ads syndication, Dr. Israel explained that "there is an existing competitive syndication market. . . . there certainly hasn't be[en] an expert who has come in and said that that syndication market isn't working." Tr. 3205:15-07:22, 3196:4-97:12 (Israel) ("I don't see a scarcity in this industry.").

455. Dr. Israel noted that the RPFJ would be "disruptive to a market that already exists" by imposing "a regulatory contract" that would not "exist as a competitive outcome." Tr. 3206:10-07:22 (Israel). For instance, under the RPFJ Google would be mandated to offer a contract that other ads syndication providers could not compete with, which may "effectively remov[e] any market for syndication of advertising." Tr. 3206:10-09:9 (Israel).

456. Additionally, the ten-year term of the ads syndication license under RPFJ Section VIII.E is particularly likely to reduce rivals' investment incentives because "ten years . . . lets rivals sort of sit on this thing for a very long time. So I worry about rivals not having much incentive to develop their own service with a ten-year license." Tr. 3209:13-11:12 (Israel).

457. As a result, consumers would further lose out on the benefit of differentiated technologies. Tr. 4210:8-13:2 (Murphy).

c. Third Party Testimony Demonstrates That Disclosure of Google's Assets and Technologies Would Depress Innovation and Investment.

458. DuckDuckGo and OpenAI, in particular, expressed a desire to acquire Google's search index data. The testimony confirmed, however, that rivals can build or grow search indexes without access to Google's volume of click-and-query data—and that their failure to build indexes approaching the quality and comprehensiveness of Google's is a function of the level of investment on their part. Notably, Microsoft's witness did not testify that Bing needed access to Google's search index to compete.

459. DuckDuckGo did not begin creating its own web index until after the release of ChatGPT. Tr. 894:12-95:18 (Weinberg).

460. Mr. Weinberg was unable to quantify the size of DuckDuckGo's search index. Tr. 895:19-96:1 (Weinberg).

461. Mr. Weinberg acknowledged that DuckDuckGo "made a really conscious decision" to build a smaller search index compared to Google, but now wants access to Google's data to be able to "jump start building" a better search index. Tr. 836:21-37:20, 840:22-42:3 (Weinberg).

462. He testified that DuckDuckGo has approximately 150 employees combined working on its web index and AI work, a tiny fraction of Google's investment. Tr. 896:2-23 (Weinberg).

463. When asked whether there were improvements to DuckDuckGo's search indexes that DuckDuckGo would not be able to make without the benefit of Plaintiffs' proposal, Mr. Weinberg identified what he calls "long-tail knowledge graph data." Tr. 842:4-13 (Weinberg). He speculated that such data is "broadly based on interaction data that Google is getting that we will never be able to get at our scale." Tr. 842:4-13 (Weinberg).

464. Google's Knowledge Graph data, however, does not come from and is not improved by access to click-query data. Rather, as Ms. Reid explained, Google goes to great expense to cultivate a number of first-party and third-party data sources, which are then integrated into Google's proprietary Knowledge Graph. These efforts to obtain data sources outside the web crawl began in the 2000s, and have required continual ongoing effort. *See infra* §§ V.B.1.b-c.

465. Mr. Weinberg further testified that, if Plaintiffs' proposals were implemented, DuckDuckGo would seek to syndicate search results in order to *store them and build DuckDuckGo's index*. Tr. 830:19-25 (Weinberg).

466. Mr. Turley's testimony confirmed that OpenAI is building its own search index technology—exactly the sort of innovation that antitrust laws should encourage.

467. Mr. Turley did not testify that OpenAI lacked the ability to build a satisfactory search index. Rather, he testified that having Google's search index would free up OpenAI staff to work on other tasks. Tr. 409:11-10:22 (Turley).

468. It is unsurprising that OpenAI would prefer not to have to spend its resources on developing an index, which Mr. Turley described as "such a critical piece to the system" and one that requires a "lot of resources." Tr. 409:11-10:22 (Turley).

469. The speed at which OpenAI has built its index belies any purported need for Google's data. OpenAI first began developing its index in early 2024, and Mr. Turley's "optimistic" estimate is that OpenAI can achieve 80% of coverage by the end of this year—that is, *within two years from first beginning work*. Tr. 398:5-12 (Turley). Mr. Turley considers 100% coverage to be as little as "a couple years away." Tr. 397:8-98:13 (Turley). Google, by contrast, has built and honed its index through more than 25 years of sustained investment. *See infra* § V.B.1.

470. As to the difficulty in achieving what he described as the final 20% of coverage, Mr. Turley described the final 20% as comprised of (i) niche use cases calling for rare web sources and (ii) categories "that rely . . . on very specific information sources, like local information or video or commerce or other information that is not easy to crawl or generally available maybe because it lives in a silo." Tr. 395:22-97:7 (Turley).

471. As to the first category, Mr. Turley did not provide any specifics as to any efforts on OpenAI's part to identify high-quality sources for those niche use cases. Again, it comes as no surprise that OpenAI would welcome receipt of Google's quality signals, that is, Google's proprietary assessment of "what makes a good source . . . and what makes one source better than another." Tr. 399:21-400:12 (Turley).

472. As to the second category, Mr. Turley made no claim—and nor could he—that click-and-query data provides any advantage in acquiring those data sources. OpenAI could take its sizeable resources—i.e., the $40 billion of capital it had raised as of March 31, 2025—and develop those content pipelines, including by licensing it from content providers, just as Google has done. Tr. 498:8-14 (Turley).

473. Brian Provost from Yahoo testified that access to Google's data "would help [Yahoo] to refine the quality of [its] products," but gave no specifics as to any past investment efforts on Yahoo's part. Tr. 1246:24-48:24 (Provost (Yahoo)); RDX0109.

474. There was no testimony from Microsoft or Perplexity regarding any purported need for either the index-disclosure proposal or for the user-side data disclosure proposals.

475. Indeed, the testimony of Perplexity's Dmitry Shevelenko confirmed that rivals can build competitive search engines at a fraction of the time and investment that Google has put into its search engine.

476. Perplexity was founded in August 2022, and released its "answer engine" in December 2022. Tr. 732:4-7 (Shevelenko (Perplexity)).

477. It trained its query understanding model in four to six months' time, and built a web index whose size was approaching diminishing returns for single-digit millions of dollars. Tr. 794:13-96:17 (Shevelenko).

478. To run a semantic search over its index, Perplexity uses a version of another company's open-source technology that cost Perplexity less than $10 million to modify. Tr. 797:2-16 (Shevelenko).

479. Perplexity uses approximately fifty different data signals to determine what sources to use. Tr. 699:8-15 (Shevelenko).

480. As of its last fundraising round, Perplexity was valued at $9 billion. Tr. 733:7-12 (Shevelenko).[7]

481. Notably, Mr. Shevelenko did not testify in support of Plaintiffs' data disclosure and compelled syndication proposals. Indeed, he cautioned that in light of the "great technology and products that have come out of Google over the years that others have built on top of," "it's important that . . . there be continued innovation and open technologies, and so . . . we wouldn't want a remedy that cripples Google's ability to keep doing that." Tr. 722:11-23:6 (Shevelenko).

482. Microsoft, for its part, raised concerns to Plaintiffs that requiring Google to share its search index "with metadata" would reduce rivals' innovation incentives. Smutny (Microsoft) (30(b)(6)) Dep. Tr. 83:6-21.

483. With respect to click-and-query data, Mr. Turley testified that OpenAI would "ideally" need more data for the less common queries. Notably, however, in response to the Court's question regarding how OpenAI sources click-and-query data, Mr. Turley did not know the details of such data's sourcing or use. Tr. 402:6-03:10 (Turley).

484. Mr. Turley's focus on the staleness of data and rare sources goes to the comprehensiveness of the index, not ranking; Mr. Turley was clear the information was required for building a comprehensive index. Tr. 402:24-03:10, 411:3-19 (Turley).

485. Similarly, with respect to search syndication, Mr. Turley's testimony was not that OpenAI is unable to compete, but rather that it would benefit from access to specific Google technologies and data afforded by Plaintiffs' proposal. Tr. 423:3-24:8 (Turley).

[7] Recent press reports indicate that Perplexity's valuation has since increased to $14 billion. *See, e.g.*, Berber Jin, *AI Startup Perplexity's Valuation Surges to $14 Billion in New Funding Round*, Wall St. J. (May 12, 2025), *available at* https://www.wsj.com/tech/ai-startup-perplexitys-valuation-surges-to-14-billion-in-fresh-funding-round-26124482.

486. Mr. Weinberg likewise testified that he believes that compelled syndication could address DuckDuckGo's shortcomings relative to Google—but he did not claim to have made the investments that Google has made to develop its superior assets and technologies. Tr. 831:11-32:1, 832:10-33:13 (Weinberg); RDX0171; RDX0170*.

487. Moreover, Mr. Weinberg testified that, under the terms of its syndication agreement with Microsoft, DuckDuckGo must "display everything that [Microsoft] send[s]," and cannot offer, for example, ads other than Microsoft's, with certain limited exceptions. Tr. 963:7-71:11 (Weinberg); RDX0454 at .001, .028 (generally requiring DuckDuckGo to "use only the Bing API for all of its advertising and algorithmic internet search functionality" until [redacted] whereupon the agreement may automatically renew for [redacted]).

488. Mr. Provost confirmed that, during the term of its syndication agreement with Microsoft, which runs through December 21, 2030, Yahoo "is not allowed to syndicate algorithmic search or search ads from any partner other than Microsoft," except for limited carve-outs Yahoo has for its third-party content agreements and its own local search offering. Tr. 1272:16-75:4 (Provost). In other words, Yahoo could not syndicate Google search results or Google search ads during the term of its Microsoft agreement. Tr. 1275:12-17 (Provost); RDX0511 at .002; RDX0513.

489. Microsoft, for its part, advocated *against* the syndication proposal, telling Plaintiffs that the proposal "is essentially putting a rival's wrap on top of Google's search engine" and "would undermine the investments that rival search engines had made in creating their own search engines, because you would effectively create clones that anyone could use." Smutny (Microsoft) (30(b)(6)) Dep. Tr. 35:19-36:10.

490. Plaintiffs only brought two third-party fact witnesses to support the ads data disclosure and syndication proposals in the RPFJ.

491. Mr. Weinberg testified that DuckDuckGo does not operate its own ad network and currently syndicates its ads from Microsoft. Tr. 851:12-23 (Weinberg).

492. Because DuckDuckGo has "no plans at the moment of operating [its] own ad network given [its] current syndication contract[,]" Mr. Weinberg instead suggested that the Ads Data Google must share under RPFJ Section VI.E "might be . . . useful to Microsoft which would benefit us because we are syndicating Microsoft's ads." Tr. 851:12-52:14 (Weinberg).

493. Yet, Microsoft's Michael Schechter did not ask the Court to impose a data disclosure remedy. And with respect to ads syndication, Microsoft advocated against the syndication proposals. Tr. 1064:14-65:20 (Schechter (Microsoft)); Smutny (Microsoft) (30(b)(6)) Dep. Tr. 34:22-35:13, 35:19-36:10.

494. Moreover, when asked by the Court what types of Ads Data would benefit DuckDuckGo, Mr. Weinberg reiterated that DuckDuckGo does not operate its own ad network, so Mr. Weinberg was "not sure relative to these other sections which data is essential scale-wise[.]" Tr. 849:14-50:8 (Weinberg).

495. Adam Epstein of adMarketplace—a firm that does not compete in the relevant market for general search text advertising—testified in support of ads syndication proposals. Tr. 1834:4-16 (Epstein (adMarketplace)) (confirming that adMarketplace does not place text ads on the search results pages of GSEs, such as Google, Bing, DuckDuckGo, or Ask); *see also* Tr. 3211:18-12:7 (Israel) (testifying that Mr. Epstein's testimony was "not relevant to the issues here because it's describing issues in a different market"); RDX0703* at .003 (Plaintiffs'

interrogatory response naming firms that currently qualify as providers of a GSE or search text ads, which does not name adMarketplace).

496. adMarketplace offers "AMP Results," a product that places suggested ads beneath the search box as the user enters her query, before the user arrives at the search results page. Tr. 1786:24-88:10 (Epstein).

497. Putting aside that AMP Results is not a product within the general search text ads market, when asked what would improve adMarketplace's relevance targeting, Mr. Epstein did not testify that the RPFJ Section VI.E Ads Data would be beneficial. Tr. 1791:9-92:11 (Epstein).

498. Instead, Mr. Epstein explained that adMarketplace is interested in "backfill[ing] with the Google feed" through Plaintiffs' ads syndication proposal because "when you have every advertiser, you're able to have more relevance to the user." Tr. 1807:20-09:1 (Epstein).

499. Mr. Epstein testified that access to Google's search ads syndication results would enable adMarketplace to compete against Google to place the same ad from the same advertiser on a publisher's site, and to win the ad placement by offering the publisher a higher cost-per-click on that advertisement. Tr. 1810:10-12:13 (Epstein).

500. Illogically, although Mr. Epstein advocated for a scenario in which an advertiser like Home Depot bids against itself to place an ad on a publisher's site, allowing the publisher to select the same Home Depot ad from either Google or from adMarketplace (depending on which ads syndication provider could offer a higher cost-per-click for Home Depot to pay), Mr. Epstein claims that adMarketplace would "also be charging . . . less money to the advertiser." Tr. 1807:20-08:1 (Epstein).

5. Plaintiffs Offered No Economic or Industry Expert Testimony Supporting Their Data Disclosure and Syndication Proposals.

501. Plaintiffs' economic expert Dr. Chipty admits that Plaintiffs' data disclosure and syndication provisions can give rise to "a free-rider problem," affecting "incentives to innovate in the future . . . if one firm could, say, ride on the coattails of another firm's future innovation." For instance, the data disclosure and syndication provisions could "dampen Google's incentives to innovate in the future if Google had to share the benefits of its innovations with its rivals." And they could impact "whether rivals would have incentives to innovate in the future if it could take advantage of Google's innovation." Tr. 2165:23-66:11 (Chipty).

502. According to Dr. Chipty, in deciding whether to order this remedy, the Court will need to determine "whether the incentive dampening effects of innovation can actually be offset by any investment-enhancing effects of the remedies." That is, in her view, these admitted harms to competition need to be "weighed" against any purported benefits from the provisions. Tr. 2166:12-67:22 (Chipty).

503. But Dr. Chipty did not do any such weighing because she did not have an understanding of the data to be shared. Because both the harm to competition and the purported benefits to rivals depend on the specifics of the compelled data disclosure and syndication, Dr. Chipty could not assess that balance without "getting into the data specifics, which I cannot." Tr. 2166:12-67:22 (Chipty); *see also id.* 2165:10-16.

504. In short, Dr. Chipty's analysis of Plaintiffs' syndication and data disclosure provisions is conclusory and not connected to Plaintiffs' actual proposal because, as Dr. Chipty admits, she does not know the "details" of what will be provided to Qualified Competitors. Tr. 2166:12-67:22 (Chipty).

505. Dr. Chipty did not assess whether the data that is required to be disclosed is limited to scale dependent inputs. Nor did Dr. Chipty assess "whether [P]laintiffs' remedies will allow rivals to reverse engineer Google search results." Tr. 2228:21-29:21, 2236:4-12 (Chipty).

506. And Dr. Chipty admitted that she does not "know enough to tell" whether "the search syndication remedy in this case requires Google to provide its search results in response to any query a competitor issues." Tr. 2237:19-38:6 (Chipty).

507. Dr. Chipty does not "have a view on the specific data that should be shared," only that "some form of data sharing" would help rivals. Tr. 2230:11-21, 2206:6-15 (Chipty).

508. As a result, Dr. Chipty admits that she cannot give "an opinion on data disclosures and how to draw that line," including "whether plaintiffs' proposed remedies go too far in terms of data disclosures." Tr. 2235:22-36:3 (Chipty).

509. While Dr. Chipty suggests that Plaintiffs' data disclosure and syndication provisions would help rivals "develop their own capabilities," her testimony is conclusory. Tr. 2162:10-64:1 (Chipty). Neither she nor the witness testimony she relies on discusses any details of Plaintiffs' proposals or how competitors would actually use them. Tr. 2164:2-65:9 (Chipty); PXRD012 at 29-34.

510. Plaintiffs did not call any other expert to explain how the *specific* data disclosures and syndication proposed in Sections VI and VII of the RPFJ would benefit competition among search engines and whether those benefits would be outweighed by the harm to innovation.

B. The Forced Disclosure of Google's Search Index Data Would Deprive Google of Its Proprietary Assets and Intellectual Property, Violate Users' Privacy, and Degrade Search Quality.

511. Plaintiffs' RPFJ broadly defines "Search Index" as "any databases that store and organize information about websites and their content that is crawled from the web, gathered

from data feeds, or collected via partnerships, from which Google selects information to provide results to users in response to general search queries." Pls.' RPFJ § III.X.

512. On a "periodic basis" and at "marginal cost," Plaintiffs' RPFJ Section VI.A would require Google to disclose the following "Search Index" data:

a. a unique identifier ("DocID") of each document in Google's Search Index and information sufficient to identify duplicates;
b. "a DocID to URL map";
c. "a set of signals, attributes, or metadata associated with each DocID that are derived in any part from User-side Data" for each DocID; and
d. "databases consisting of information sufficient to recreate Google's Knowledge Graph, including local information."

Pls.' RPFJ § VI.A.

513. In discovery, Plaintiffs were clear that these compelled disclosures would go well beyond crawled content and data. Rather, Google would be required to provide competitors with the data it maintains "for every website contained in Google's Search Index," regardless of whether Google obtained it via web crawl, data feeds, directly from users or businesses, or licenses (unless the license prohibits disclosure). RDX0706 at .003.

514. In practice, then, Google would be forced to divulge a unique document identifier (DocID), including deduplication data, and a URL map for every one of the hundreds of billions of webpages in Google's many search indexes; Google's stored ranking signals in any way influenced by User-side Data; and Google's more than 500-billion-fact Knowledge Graph and its underlying databases, including Local data. Tr. 3432:22-33:15, 3435:13-36:7 (Reid); RDXD-28.003, .013.

515. Plaintiffs' search index proposal, as with their user-side data and syndication proposals discussed below, would directly disclose many Google Search technologies—that is,

Google's proprietary algorithms, models, and processes—developed over decades of engineering effort and innovation. The disclosures would further allow competitors to reverse engineer additional Google technologies—whether via mimicking or "back[ing] out." Tr. 2779:1-20, 2780:23-81:15 (Allan); RDXD-20.003; *see infra* §§ V.B.2, C.1, E.2-3.

516. The repeated disclosures envisioned by Plaintiffs' proposals would reveal and allow a competitor to reverse engineer future Google technologies and additional current Google technologies. Tr. 2780:23-81:15 (Allan); *see infra* ¶¶ 619-20, 663-65, 875 (describing effects of repeated disclosures).

1. Plaintiffs' Search Index Proposal Would Hand Over to Rivals Core Google Search Assets, Which Are the Product of Sustained Investment and Innovation.

517. The Court heard testimony regarding Google's search indexes from Ms. Elizabeth Reid, who joined Google in 2003, worked for years as an engineer in Google's Geo and Local teams, and currently serves as Head of Search. Tr. 3428:11-30:6 (Reid).

518. As Ms. Reid explained, Google has invested and engineered for decades to develop its search indexes, an effort that continues today. Tr. 3436:8-44:6, 3446:14-78:7 (Reid); *see also* Liability Tr. 6304:22-05:3 (Nayak (Google)).

519. At a high level, to create its search index, Google gathers helpful information for users and then processes and organizes that information into different indexes. Tr. 3435:13-37:6 (Reid).

520. One such index is the web crawl index, which is how Google organizes the information derived from the trillions of websites it crawls. Tr. 3436:8-37:6 (Reid).

521. The number of Google employees who work on crawling, analyzing, and indexing webpages alone are in the hundreds. Tr. 3442:4-6 (Reid); RDXD-28.006.

522. Beyond the web crawl index, Google has worked for "well over 20 years" to develop specialized vertical indexes that allow Google to serve information beyond what can be retrieved from the web. Tr. 3449:10-50:22 (Reid).

523. Google employs "multiple thousands" of people who work on its vertical indexes. Tr. 3450:23-25 (Reid).

524. Another example is the Knowledge Graph, a database of over 500 billion facts about real-world people, places, and things and the relationships between them. Tr. 3466:12-67:1, 3469:18-25 (Reid); RDX0058* at .001.

525. Google employs well over 1,000 people who work on its Knowledge Graph. Tr. 3472:24-73:7 (Reid); RDXD-28.013.

526. In addition to its full-time workforce, Google pays well over 10,000 contractors and vendors to work across its search indexes. Tr. 3458:7-12, 3465:5-66:1, 3476:24-77:16 (Reid).

a. Google's Web Crawl Index.

527. The open web is "vast" and contains enormous amounts of spam, duplicate pages, and other low-quality pages that "add no additional value to users." Tr. 3436:8-37:3 (Reid); RDXD-28.005.

528. Of these trillions of pages, Google identifies and indexes a valuable subset of pages for its web index. Tr. 3436:8-37:6 (Reid).

529. Today, Google's web crawl index contains approximately [redacted] billion webpages. Tr. 3436:8-37:6 (Reid); Tr. 2794:10-95:15 (Allan); RDXD-28.006.

530. The indexing process occurs in three primary stages: crawling the web, analyzing webpages, and building a sharded index. Tr. 3436:8-42:3 (Reid); RDXD-28.006.

531. The process starts with crawling. Every day, Google crawls [redacted] billion pages and ingests [redacted] of data. Tr. 3437:7-21 (Reid); RDXD-28.006.

532. Google designed its crawling technology to process diverse data formats on the open web including text, PDFs, images, and videos. Tr. 3447:12-20 (Reid).

533. Google does not naively crawl the web, or waste crawl time on pages unlikely to matter to users; rather, Google developed proprietary crawl systems to focus on crawling parts of the web most likely to be useful to users. Tr. 3438:2-25 (Reid); RDX0062 at .005.

534. Google's crawl systems rely in part on Google's proprietary page quality and freshness signals. These technologies allow Google to crawl fresh pages like news sites more frequently while avoiding overloading websites. Tr. 3437:7-38:25 (Reid).

535. Beyond signals, Google also arranges for data feeds to efficiently acquire fresh content. Tr. 3438:2-25 (Reid).

536. As Google crawls pages, it also discovers new page links and may crawl those pages as well. Tr. 3438:2-9 (Reid).

537. As Ms. Reid explained, in general, websites want to be found by search engines so that they receive more traffic. It is uncommon for a website to allow Google to crawl it but to disallow other search engines. Tr. 3439:1-20 (Reid).

538. To analyze crawled data, Google marks up webpages with more than [redacted] proprietary annotations. Tr. 3439:21-40:11 (Reid); RDXD-28.006.

539. Teams that focus on webpage understanding, web result ranking, vertical ranking and content, and the Knowledge Graph all contribute to this work. Tr. 3440:12-41:5 (Reid).

540. Google also developed specialized methods for processing crawled video and image data. For example, Google works to understand video content, which often does not include text and raises challenges from an indexing perspective. Tr. 3447:12-48:23 (Reid).

541. To build the index, Google uses the "table of all the webpages" generated in the annotation phase to create index "shards" to optimize retrieval. Tr. 3441:6-42:3 (Reid).

542. Google organizes its search index into its proprietary tiering structure, based on how frequently it expects the content will need to be accessed and how fresh the content needs to be. Tr. 3444:7-45:24 (Reid); RDX0062 at .013-.014.

543. Google's tiering structure saves computational resources. RDX0062 at .013.

544. Google employs several hundred people (at least) who work on the crawling, analyzing, and indexing stages of building the web crawl index. Tr. 3442:4-6 (Reid); RDXD-28.006.

545. At every stage of creating the web crawl index, Google works to fight spam—a "giant" problem. Even though Google endeavors to avoid crawling known spam pages to conserve resources, more than half of what Google crawls is spam. Google then marks up crawled spam with additional spam signals. At serving time, Google also incorporates real-time signals to further detect and demote spam. Through these efforts, Google is able to reduce spam at serving time to less than one percent. Tr. 3442:21-43:14 (Reid).

546. Ms. Reid testified that user data plays a minimal role in the three stages of creating the web crawl index. Tr. 3442:7-20 (Reid).

547. Yet, under Plaintiffs' proposal, Google would be forced to hand over to rivals the end product of Google's expensive and innovative crawling, page understanding, indexing, and spam fighting technologies: a unique DocID and URL map for every one of the roughly [redacted]

billion webpages selected for inclusion in Google's web index. Tr. 3432:22-33:15, 3436:8-37:6 (Reid); Tr. 2794:10-95:13 (Allan); RDXD-28.006.

b. Google's Vertical Indexes.

548. For well over 20 years, Google has worked to develop its specialized vertical indexes. Tr. 3450:8-22 (Reid).

549. These vertical indexes allow Google "to answer different questions that are not necessarily available on the web or that are [not] fresh enough on the web." Tr. 3449:10-50:7 (Reid). For a given vertical, Google works to understand what users want to know and "invests in collecting additional data" to better answer those types of questions. Tr. 3449:10-50:7 (Reid).

550. Thousands of Google employees work on these vertical indexes, distributed among larger teams working on Geo and Shopping and smaller teams devoted to topics like Weather. Tr. 3451:1-11 (Reid).

551. Google also uses vertical ranking signals to understand vertical content, such as product and restaurant results. These specialized results require different ranking signals because users have different expectations of what is important about them. Tr. 3451:12-53:1 (Reid).

552. Google dedicates several hundred employees to focus on vertical ranking. Tr. 3453:2-5 (Reid).

553. Google's Geo index is a prominent example of Google's efforts to meet users' specialized information needs. Google's Geo team focuses on providing real-world information to create "a super rich 3D model of the world," drawing on data sources including satellite imagery, Street View cars, merchants, and content submitted by users. Tr. 3456:5-19 (Reid).

554. Google employs several thousand engineers within its Geo group, with over a thousand engineers focusing on processing Geo data. Tr. 3458:13-16 (Reid).

555. Ms. Reid explained the various Geo data sources powering Google's local search offerings. Tr. 3456:20-58:6 (Reid); RDXD-28.009.

556. For example, Google licenses data from various feeds. Tr. 3456:20-58:6 (Reid).

557. Google also pays for Street-View cars that not only provide images of businesses but also allow Google to discover new businesses. Tr. 3456:20-58:6 (Reid).

558. Google's Geo group runs the Local Guides program, a community of people who contribute information about places such as opening hours. Google offers perks, levels, and competitions to encourage submissions. Tr. 3460:10-61:11 (Reid); DX0208 at .003-.004.

559. Google acquires the majority of its user-generated content from the Local Guides program. As of 2020, Local Guides had contributed 75% of user-generated content to Google Maps. DX0208 at .001 ("360M unique Google Map contributors in 2019"), .004.

560. Google also employs about 10,000 vendors who focus solely on acquiring Geo data for Local and Maps. These vendors, for example, call businesses to inquire about opening hours and other information, verify Street View content, and trace satellite imagery for new roads in areas for which Google cannot find pre-existing road data. Tr. 3458:17-59:13 (Reid).

561. Google receives opening hours data from three main sources: from businesses directly, from Local Guides and users, and from paid vendors who call businesses. Street View cars also extract opening hours data from images of businesses. Tr. 3459:15-60:9 (Reid).

562. Google has spent billions of dollars to acquire the rich datasets underlying its Geo and Local offerings, even, for example, "send[ing] people in India door to door because there were no directories of many of the businesses around." Liability Tr. 8229:18-30:12 (Reid).

563. There was no testimony that these Geo data sources powering local search are "scale-dependent." As to local ranking, user interaction data plays a "quite small" role; the

predominant factors in local ranking are the data sources themselves, such as reviews and distances. Tr. 3461:12-24 (Reid).

564. Plaintiffs' search index proposal targets "any databases that store and organize information about websites," including non-crawled content. Pls.' RPFJ § III; Tr. 3453:8-54:20 (Reid); RDX0708 at .003; Tr. 3453:8-54:20 (Reid); RDXD-28.008.

565. Accordingly, Google would be forced to turn over significant vertical assets to rivals, including Geo data, despite the fact that much of Google's vertical data is not mapped to a DocID as Plaintiffs assume. Tr. 3435:13-36:7, 3454:21-55:7 (Reid).

566. In addition, competitors would receive other vertical data assets in ready-to-serve fashion via the compelled syndication of Google's Local, Maps, Video, Images, and Knowledge Panel content. *See infra* § V.E.

c. Google's Knowledge Graph.

567. Google's Knowledge Graph is a massive, structured database of five billion real-world people, places, and things with over 500 billion relationships between them. Tr. 3466:12-67:1, 3469:18-70:7 (Reid); Tr. 2806:19-07:8 (Allan).

568. Google began developing its Knowledge Graph in 2010. Tr. 3474:14-16 (Reid).

569. At the time, there were significant doubts in the academic community that taxonomies or natural language processing technologies could be useful for search. Tr. 2805:7-06:18 (Allan) ("For decades, people in information retrieval have been trying to use things like Knowledge Graphs or taxonomies or natural language processing to improve the quality of . . . search; and almost without exception, it failed. And so when Google started doing this, I figured it was doomed to failure. And all credit to Google, they figured out how to make it work. You know, despite a huge track record in the research community of failure, they made it work.").

570. Nonetheless, Google successfully launched its Knowledge Graph in 2012. At the time, no other search engine had matched Google's breakthrough with an equivalent database in terms of quality, breadth, and depth. Tr. 3474:14-16, 3475:6-11 (Reid).

571. This breakthrough represented "a huge improvement to Search." Tr. 3474:14-75:5 (Reid).

572. Google uses Knowledge Graph to help address user information needs, even when the information that users seek is not on the web. Tr. 3468:23-69:17 (Reid).

573. Adding data to the Knowledge Graph is an innovative, complex, and constant process. Data ingestion and addition to the Knowledge Graph typically begins with vertical teams gathering public and licensed information from different sources. Tr. 3470:8-71:10 (Reid); RDX0064* at .001.

574. Approximately one thousand vertical team members work on the more than [redacted] data feeds and pipelines that feed into the Knowledge Graph. Tr. 3472:24-73:7 (Reid); RDXD-28.013.

575. Google then transforms feed data into a structured format that is compatible with the Knowledge Graph. Tr. 3471:11-22 (Reid).

576. Google also evaluates feed data quality and where data fits in with the existing Knowledge Graph. Tr. 3472:6-14 (Reid).

577. Google also reconciles new data with data already in the Knowledge Graph, accounting for whether data concerns a "brand-new entity" or is updating pre-existing data. Tr. 3471:11-25 (Reid).

578. Finally, before loading newly structured data into the Knowledge Graph, Google conducts experiments to ensure seamless data integration. Tr. 3471:11-72:14 (Reid).

579. Knowledge Graph feed data is "constantly chang[ing]," and Google works to ensure it accurately manages data ingestion for the "many updates per second" to the Knowledge Graph. Tr. 3471:11-72:21 (Reid); RDXD-28.013.

580. Real-world entities do not always correspond to a web URL or other unique identifier, making the data reconciliation process incredibly difficult. Tr. 3473:8-74:13 (Reid); RDXD-28.013; RDX0063* at .001.

581. Google employs several hundred people who work across the various stages of Knowledge Graph data ingestion. Tr. 3472:24-73:2 (Reid).

582. In addition to external data feeds and pipelines, Google also draws on a range of internal data sources and similarly reconciles data to construct the Knowledge Graph. Tr. 3475:19-76:16 (Reid); RDXD-28.014.

583. Google employs many vendors to assist specifically with Knowledge Graph indexing and curation. Tr. 3476:24-77:16 (Reid).

584. In addition to providing an unparalleled source of knowledge for users, the Knowledge Graph also enhances Google's ability to understand queries and serve results. Tr. 3477:17-78:7 (Reid).

585. Since 2012, excluding data acquisition costs, Google has spent several billion dollars on the Knowledge Graph. Tr. 3475:12-18 (Reid).

586. Factoring in the additional cost of acquiring Geo and Shopping data incorporated into the Knowledge Graph, Google has spent over $20 billion on the Knowledge Graph. Tr. 3475:12-18 (Reid).

587. Click-and-query data does not play a meaningful role in building the Knowledge Graph. Tr. 3478:8-17 (Reid) ("Q. And, Ms. Reid, what role, if any, does user click-and-query

data play in building this Knowledge Graph? A. I'm not aware of anything that's particularly meaningful. It's possible that there's sort of a second order signal across where, okay, we understand something may be about aliases of -- of a particular entity that was improved by user data, but recall this is about underlying data, data feeds and -- or webpage markups that we've gotten that we've processed and pulled together.").

588. Yet, Plaintiffs would require Google to furnish rivals with Google's proprietary Knowledge Graph data. Tr. 2806:19-07:8 (Allan).

2. Plaintiffs' Search Index Proposal Would Compel Google to Divulge Its Proprietary Annotations, Ranking Signals, and Other Trade Secrets.

589. Google's proprietary search index technologies are the result of its sustained investments and exhaustive engineering efforts. Tr. 3515:24-17:8 (Reid).

590. As Google expert Professor James Allan explained, Plaintiffs' search index proposal would force Google to directly disclose not only various ranking signals contained in its web crawl index but also the structure of its Knowledge Graph, which is itself a Google technology. Tr. 2791:8-92:11, 2793:1-95:15, 2806:19-07:8 (Allan).

591. Moreover, the forced disclosure of proprietary ranking signals that Google stores in its web crawl index would enable competitors to reverse engineer additional signals that are not directly disclosed under Plaintiffs' proposals. Tr. 2800:15-02:18 (Allan).

a. Disclosed Deduplication, Crawling, and Tiering Technologies.

592. Plaintiffs' search index proposal would provide competitors insight into Google's proprietary deduplication, crawling, and tiering technologies.

593. Disclosure of a unique document identifier (DocID) and a "notation sufficient to denote all the documents Google considers duplicates of each other," Pls.' RPFJ §§ VI.A.1-2,

provides competitors with direct insight into Google's deduplication technologies. Tr. 2817:13-25 (Allan).

594. With the "time that the URL was last crawled" metadata for every page in Google's indexes (Pls.' RPFJ § VI.A.3), rivals could determine how frequently Google crawls existing webpages by analyzing this metadata across each periodic disclosure. Tr. 3437:7-38:25 (Reid); Tr. 2817:13-19:5, 2844:5-45:24 (Allan).

595. The frequency with which Google crawls each webpage reflects Google's assessment of how important freshness is for that page, and periodic disclosures of search index data would provide rivals with insight into Google's proprietary freshness signals. Tr. 3446:23-47:11 (Reid); Tr. 2844:5-45:24 (Allan); RDX0062 at .013-.014.

596. The frequency with which Google crawls each webpage is also a function of which index tier Google places that webpage in, and period disclosures would provide rivals with insight into Google's proprietary index tiering structure. Tr. 3444:7-45:3 (Reid); Tr. 2844:5-45:24 (Allan); RDX0062 at .006, .013-.014.

b. Disclosed Stored Signals.

597. Google built its search ranking technologies over the past 25 years, enlisting thousands of engineers and computer scientists in its innovation efforts. Tr. 2464:20-65:25 (Pichai).

598. Today, there are nearly one thousand Google engineers who work on improving search ranking signals. Tr. 3465:2-4 (Reid).

599. When a user enters a query, Google combines hundreds of signals to determine the overall ranking of results, drawing from webpage information, proprietary query understanding technology, and comparisons between the query and information in the large array

of webpages that Google's technologies have selected for potential display on the SERP. Tr. 2786:15-87:24, 2788:1-13 (Allan).

600. To create any such ranking signal, a Google engineer must first come up with the idea for it—a process which is unrelated to click-and-query data. The idea must be translated into an algorithm that can determine how to measure for that idea, and the algorithm must be normalized to produce an output that Google can then use as one among hundreds of differently weighted signals to produce a final ranking score. Tr. 3463:10-65:1 (Reid); Tr. 2795:16-99:22, 2801:19-02:18 (Allan); RDXD-20.020-.021.

601. Google engineers then continue to "brainstorm . . . new signals or new ideas on how to make that signal better," typically spending "several iterations" where they just "throw it out," and employing human raters once they find "something promising," to learn further lessons about what has worked well and what has not. Tr. 3463:10-65:1 (Reid).

602. For example, Google's human raters will compare the utility of a new version of a signal against prior versions across a large number of queries to determine which use cases demonstrate an improvement. Tr. 3465:5-66:1 (Reid).

603. Google spends over one hundred million dollars per year on its human rater program. Tr. 3466:2-7 (Reid).

604. Following this same general process, Google's engineers developed every one of the hundreds of signals involved in Google's ranking system—all with a belief that they would capture "something important for search." Tr. 2786:15-87:24 (Allan).

605. Many of these proprietary ranking signals are stored in Google's web search index. Tr. 2791:13-92:7 (Allan); RDX0041 at .001 (identifying a set of top-level ranking signals used as part of Google's "[redacted]" function); Tr. 3439:21-40:11 (Reid); RDX0062 at .009.

606. Plaintiffs' RPFJ Section VI.A.3 expressly requires Google to divulge for each DocID the following data: "for each DocID a set of signals, attributes, or metadata associated with each DocID that are derived in any part from User-side Data including but not limited to (A) popularity as measured by user intent and feedback systems including Navboost/Glue, (B) quality measures including authoritativeness, (C) time that the URL was first seen, (D) time that the URL was last crawled, (E) spam score, (F) device-type flag, and (G) any other specified signal the TC recommends to be treated as significant to the ranking of search results[.]" Pls.' RPFJ § VI.A.3.

607. Competitors would receive—for every one of the hundreds of billions of webpages in Google's index—the values for Google's page quality signal, popularity signal, and spam signal. Tr. 2792:12-94:9 (Allan); RDXD-20.018-.019.

608. These disclosures amount to "a huge amount of proprietary data" that Google has innovated for years to develop. Tr. 3462:1-63:3, 3527:8-28:11 (Reid); Tr. 2464:20-65:25 (Pichai); Tr. 2817:13-19:5 (Allan).

609. With a repository of these stored quality signals, competitors could mine for and extract terms or other features indicative of what Google deems high-quality or low-quality websites. Tr. 2794:10-95:15 (Allan); RDXD-20.019, .022-.023.

610. Competitors could also use these disclosed signals to mimic or otherwise reverse engineer additional Google technologies. With Google's quality signal for each webpage, for example, competitors could predict the quality of new webpages from the same website, even where those webpages are not included in Google's web crawl index. Tr. 2794:10-95:15 (Allan); RDXD-20.019.

611. Rivals could also reverse engineer Google's freshness signals, which are used to capture whether queries are aiming for "fresh" (recent) information and whether a particular page contains fresh content. Tr. 3437:7-38:25, 3446:23-47:11 (Reid).

612. As part of Google's ranking system, various "top-level" signals are calculated by aggregating component, or "sub," signals. Tr. 2793:1-94:9, 2795:16-97:6 (Allan).

613. The required disclosure of top-level signals would allow competitors to determine undisclosed component signals as well. For example, competitors could use top-level Q* scores in combination with directly disclosed sub-signals to solve for other, undisclosed sub-signals. Tr. 2800:15-02:18 (Allan); RDXD-20.022.

614. Competitors could also determine other, undisclosed top-level signals by analyzing the expressly disclosed top-level signals, additional top-level signals that can be estimated using the data made available under Plaintiffs' proposals, and Google's final ranking score. Tr. 2802:19-03:9 (Allan); RDXD-20.023.

615. Beyond these specific examples, Google would be forced to disclose any other proprietary ranking signal "derived in any part from User-side Data" that the Technical Committee "recommends to be treated as significant to the ranking of search results." Pls.' RPFJ § VI.A.3; Tr. 2869:2-10 (Allan); Tr. 3462:1-63:3 (Reid).

c. Disclosed Knowledge Graph IP.

616. Plaintiffs' search index proposal would require Google to disclose "databases sufficient to recreate the Knowledge Graph, including local information." Pls.' RPFJ § VI.A.4.

617. In addition to disclosing the contents of the Knowledge Graph, which are themselves the product of billions of dollars and fifteen years of investment, *see infra* § V.B.1.c, this proposal would also require Google to disclose the Knowledge Graph's data structure, which is itself proprietary technology. Tr. 2806:19-07:8 (Allan); Tr. 3527:8-28:11 (Reid).

618. As Professor Allan explained, even a single snapshot of the data sufficient to replicate the Knowledge Graph would enable a competitor to reverse engineer the Google technologies underlying it. Specifically, such a snapshot would immediately reveal "how Google has learned to structure the contents of the Knowledge Graph, what it includes, [and] what it doesn't include"—"all of which are Google's innovations . . . developed over a long time." Tr. 2843:18-44:4 (Allan).

d. Periodic Disclosures Compound the IP Loss.

619. The scope, frequency, and duration of the forced disclosures required under Plaintiffs' search index proposal significantly compound the loss of Google's proprietary data and intellectual property. As Professor Allan explained, each of the "periodic" releases of data contemplated under Plaintiffs' proposals "reveals an incredible amount of information about Google," and would enable competitors to determine, for example: "new documents that Google has crawled"; "the way in which [Google] re-crawled"; quality signals for all new webpages added; and "what additional information has been added into the Knowledge Graph so they can see where Google is focusing its attention on providing up-to-date, new information." Tr. 2844:5-45:24 (Allan); RDXD-20.050-.051.

620. Professor Allan concluded that "every new technology that Google builds that's connected with Search is likely to be reverse engineerable out of this data." Tr. 2844:5-45:24 (Allan).

3. Plaintiffs' Proposal Would Expose Users' Personal Data Without Their Consent.

621. In addition to requiring disclosures of Google's core assets and index technologies, Plaintiffs' search index proposal would also force Google to expose sensitive user information, including user search queries, contained in Navboost and RankEmbed data.

Tr. 1136:12-37:5 (Evans (Plaintiff Expert)); PXRD007 at 10 (identifying the index provision as among the provisions that require disclosure of sensitive user data).

622. For certain ranking signals, Google associates sensitive user-derived data with webpages. Signals generated by various search quality teams are pushed to the [redacted], which attaches these signals to DocJoins. RDX0062 at .009.

623. For example, each DocJoin contains Navboost queries associated with a given webpage. Tr. 2832:1-21 (Allan).

624. Google's RankEmbed model also associates user queries with indexed webpages by embedding queries and webpages into a common embedding space. RDX0041 at .001; RDX0701 at .003.

625. Disclosing these "query reliant" index ranking signals poses serious privacy concerns as this data risks exposing user information. Tr. 3527:23-28:2 (Reid) ("So you'll see that query reliant is high privacy because then you're actually giving specific queries about a user that may reveal information[.]").

626. To the extent the Technical Committee broadens the search index disclosures to include other query reliant signals, even more personal data would be exposed. Pls.' RPFJ § VI.A.3 ("[A]ny other specified signal the TC recommends to be treated as significant to the ranking of search results.").

4. The Compelled Disclosure of Google's Search Index Would Degrade Search Quality.

627. Plaintiffs' data disclosure proposals risk allowing spammers and other bad actors posing as "Qualified Competitors" to bypass Google's spam detection technologies. Tr. 3525:22-35:26 (Reid).

628. Spammers and other bad actors could alternatively gain access to Google's disclosed data and signals via data leaks or breaches, a realistic outcome given the tremendous value of the information. *See infra* ¶¶ 717, 719-21.

629. Plaintiffs' proposals would thereby hamstring Google in its efforts to combat spam and thereby adversely impact the quality of Google's results. Tr. 3526:4-13 (Reid) ("It's always a cat-and-mouse game, but it suddenly becomes a cat-and-mouse game, where your hands are, like, really tied behind your back because you're sharing your final output and so then they can tweak it much more directly than if they're guessing and checking.").

C. Plaintiffs' Proposed "User-Side" Data Disclosures Disregard Google's Intellectual Property Rights and Google Users' Privacy.

630. Plaintiffs' User-side Data proposal would require Google to make available to competitors, at marginal cost and "while safeguarding personal privacy and security": (i) "User-side Data used to build, create, or operate the GLUE statistical model(s)"; (ii) "User-side Data used to train, build, or operate the RankEmbed model(s)"; and (iii) "[t]he User-side Data used as training data for GenAI Models used in Search or any GenAI Product that can be used to access Search." Pls.' RPFJ § VI.C.

631. Under Plaintiffs' proposal, Google would be required to make this Glue, RankEmbed, and GenAI training data available to competitors "on a periodic basis to be determined" by Plaintiffs and the Technical Committee. Pls.' RPFJ § VI.C.

632. Before disclosing this data to competitors, Google would be required to "use ordinary course techniques to remove any Personally Identifiable Information." Pls.' RPFJ § VI.D. In Interrogatory Responses, Plaintiffs defined Personally Identifiable Information as "an individual's Social Security Number alone; or an individual's name, address, or phone number in combination with one or more of the following pieces of information: date of birth, driver's

license number or other states identification number, or foreign country equivalent, passport number, financial account number, and credit card information." RDX0706 at .005.

633. Although the Plaintiffs' RPFJ refers to this as "User-side" data, the covered data encompasses far more than a user's query. The data used to build Glue also includes (i) all web results returned and their order, (ii) all search features returned and their order, and (iii) how users interacted with what was displayed to them. Tr. 2808:2-09:24, 2810:14-12:17 (Allan); Tr. 3518:22-19:18 (Reid); RDX0700 at .006-.018 (providing Glue field names); RDX0701 at .005-.006 (providing Glue aggregate field names and descriptions).

634. The feature unit data in Glue includes not just which features were displayed in response to a query, but also within-feature display and ranking information: for example, which local results were shown, which images were shown, or which sports player was featured. Tr. 3519:19-20:16, 3517:20-18:21 (Reid) ; Tr. 2807:9-08:12 (Allan); *see also* RDX0701 at .006 (listing among aggregate Glue fields "[i]nformation about a displayed search result," including "the position, result identifiers (url, or Google search feature metadata)," as well as the same information for "nested sub-results").

635. In other words, the data used to build or create Glue includes the search results and search features that constitute Google's entire Search Engine Results Page ("SERP") returned in response to individual queries. As Ms. Reid described it, "[Glue data] is basically the ranking both of the whole page but also of every sub[-]unit on the page . . . . And so it's really giving sort of logs of our ranking on a per-query basis out of all of the different levels across." Tr. 3517:21-18:21 (Reid); Tr. 2817:13-19:5 (Allan).

636. Inputs into the Glue model include additional proprietary data beyond the displayed SERP, including: specified underlying ranking signals; the information retrieval

("IR") scores for displayed search results; the query interpretation that triggers Knowledge Panels; and the salient terms for a given user query. Tr. Tr. 2807:12-08:12 (Allan); RDX0701 at .005-.006 ("[i]nformation about terms related to the query" and "logged ranking signals").

637. RankEmbedBERT (hereinafter referred to by the name of its earlier iteration, "RankEmbed"), is a Google model that uses two main sources of data: a [redacted]% sample of [redacted] of search logs including click-and-query data, and IS scores generated by human raters commissioned by Google. Liability Tr. 6364:23-65:15 (Nayak); DXD-17.016.

638. At a high-level, RankEmbed is an AI-based model that Google uses to help identify more efficiently the documents it should retrieve in response to a given query. It uses embedding vectors to retrieve documents that are semantically close to the query. RDX0060 at .009; Tr. 3510:12-11:7 (Reid); *see also* 2817:20-26:12 (Allan) (explaining concepts of embeddings and approximate nearest neighbor in LLM pre-training).

639. RankEmbed provided "significantly larger contributions to search quality with [redacted] the training data [b]ecause BERT technology is so well adapted to working with language[.]" Liability Tr. 1846:6-22 (Lehman (Google)) ("It was transformational. Once it appeared, so many variants appeared all across the tech industry because it was just so far ahead of everything else."); *see also* Liability Tr. 6350:18-51:2 (Nayak).

640. What User-side Data is not covered by Plaintiffs' proposed disclosures of Glue and RankEmbed training data is swept in by their GenAI training data proposal, such that under Section VI.C, Google would be forced to disclose to competitors essentially all of the User-side Data it maintains. Tr. 3520:17-21:12 (Reid) ("Even just one Glue statistical model captures, you know, almost all [User-side Data], but like a thumbs-up, thumbs-down on AI overviews might not be in Glue but might be in [Plaintiffs' RPFJ Section VI.C.3].").

1. The User-Side Data Proposal Would Directly Disclose Proprietary Google Technologies and Enable Competitors to Reverse Engineer Additional Google Technologies.

641. By fine-tuning a pre-trained LLM following the process Professor Allan described, a competitor could use Glue or RankEmbed training data to reverse engineer or mimic RankEmbed itself, reverse engineer or mimic Google's search results, and reverse engineer or mimic additional Google technologies like Tangram. Tr. 2828:3-37:15, 2817:6-18 (Allan); *see also* Tr. 2782:6-83:25 (Allan) (defining Tangram as Google's "system that lays out the [SERP] or describes how it should be laid out").

642. As an initial matter, Google's Glue and RankEmbed training data themselves contain Google technologies, which would be directly disclosed by the User-side Data proposal. Tr. 2832:22-33:5, 2809:8-10:13 (Allan); Pls.' RPFJ §§ VI.C.1-2.

643. As further explained below, competitors can reverse engineer or mimic Google's search results and additional Google technologies with even a one-time disclosure under Plaintiffs' User-side Data proposal. Tr. 2843:5-17 (Allan); *see infra* §§ V.C.1.a-c.

644. The repeated disclosures envisioned by Plaintiffs' User-side Data proposal would further reveal and allow a competitor to reverse engineer future Google technologies and additional current Google technologies. Tr. 2780:23-81:15 (Allan); *see infra* § V.C.1.d.

a. Forced Disclosure of Data Used to Build, Create, or Operate Glue.

645. Forced disclosure of Glue data means direct disclosure of "a huge amount" of Google's intellectual property, including, for example, Google's "underlying ranking signals," and "many, many instances of query understanding." Tr. 3517:20-18:21 (Reid); Tr. 2809:8-10:13, 2843:5-17, 2808:2-12 (Allan).

646. Beyond these direct disclosures, Professor Allan explained the process by which competitors could fine-tune an LLM on Glue training data to reverse engineer Google's search results and additional Google technologies, like RankEmbed or Tangram. Tr. 2834:12-37:15 (Allan); Tr. 3518:8-20:16 (Reid) ("Glue takes in -- in order to essentially predict, it's taking in the ranking of each unit, the quality scores of that unit overall, and then, in addition, you know, did a user click on it. . . . [T]hat is a lot of training data for an LLM to reproduce essentially [Google's] IP."); RDXD-20.039-.040, .044, .046.

647. The LLM pre-training process involves exposing an LLM to large amounts of text so that it can learn about relationships between words. Once an LLM—in Professor Allan's demonstration, a BERT model—has been pre-trained, each word, phrase, query, document, or webpage can all be represented by sets of numbers called embedding vectors. Tr. 2820:2-23:22, 2826:13-27:15 (Allan); RDXD-20.037-.038.

648. Pre-trained LLMs are widely and publicly available, downloadable by anyone. Competitors could alternatively pre-train their own LLM. Tr. 2823:24-24:15, 2831:7-24 (Allan).

649. Professor Allan described the process by which pre-trained LLMs can then be fine-tuned for search tasks. Google, for example, followed this fine-tuning process to train its own RankEmbed model, and competitors could train similar models with the data Google would be forced to provide. Tr. 2831:1-24 (Allan).

650. As Professor Allan explained, fine-tuning such pre-trained LLMs requires, essentially, queries and a combination of good-page and bad-page matches for those queries. With that training data, the LLM can assign similarity scores to the webpages, based on their relative distance from the query in the embedding space, and feed those pages and similarity

scores back through the BERT network to more and more closely approximate the desired outcome. Tr. 2828:4-30:24 (Allan); RDXD-20.039-.040.

651. If Google were forced to disclose Glue training data, a competitor could take either Glue's query and associated click information or query and ranked results information and use those Google results to train a system to mimic Google's ranking. Tr. 2834:12-36:8 (Allan); RDXD-20.044; Tr. 3519:19-20:16 (Reid).

652. Glue training data could likewise be used to reverse engineer Google's Tangram technology and to replicate Google's output in terms of which features to trigger (and where) in response to a query. Tr. 2782:5-83:25, 2836:9-37:15 (Allan); RDXD-20.046.

653. As Professor Allan explained, "the more [data] that is disclosed, the easier it is to reverse engineer." Under Plaintiffs' proposed Glue data provision, Google would be required to provide "an incredibly large amount of information," including Google's ranked results, which on its own "is enough to be able to reverse engineer." Tr. 2840:4-16, 2808:2-15 (Allan).

b. Forced Disclosure of Data Used to Train, Build, or Operate RankEmbed.

654. The data used to train, build, or operate RankEmbed provides competitors with all the data that Google uses to build its proprietary RankEmbed model—and, accordingly, all the data competitors would need to "plug it in[]" and "build their own [RankEmbed]." Tr. 2831:7-24 (Allan); Tr. 195:25-97:19 (Durrett (Plaintiff Expert)) (confirming that "produc[ing] a copy of the RankEmbedBERT model . . . would be especially feasible to do").

655. RankEmbed's training data contains the outputs of other key Google technologies, including query-based salient terms ("QBST") and document salient terms. Tr. 2832:22-33:5 (Allan); RDX0701 at .003 (providing RankEmbedBERT field names and descriptions).

656. QBST is a means of determining which terms are important to a user query, which terms are semantically related, and what other information may be relevant to the query, incorporating input from additional Google technologies like the Knowledge Graph, and ultimately transforming queries into weighted vectors of their salient terms in the embedding space. Tr. 2833:8-22 (Allan); RDX0060 at .009.

657. Document salient terms similarly enable Google to better determine which words matter in a given document, incorporating an analysis of terms that are most relevant to the document. Tr. 2833:24-34:11 (Allan).

658. Forced disclosure of RankEmbed training data thus requires Google to directly reveal the results of its proprietary technologies, like QBST and document salient terms. Tr. 2832:22-33:5 (Allan); RDX0701 at .003.

659. Beyond the direct disclosures of Google technologies required under Plaintiffs' proposed RankEmbed training data provision, Dr. Allan explained the process by which competitors could fine-tune an LLM with RankEmbed training data to reverse engineer Google's search results and additional Google technologies, including RankEmbed itself. Tr. 2831:7-24 (Allan); *see supra* § V.C.1.a.

660. Armed with a pre-trained LLM, the key inputs a competitor would need to fine-tune the LLM to produce search results that would mimic the results of Google's RankEmbed model would be queries and a combination of good-page and bad-page matches for those queries—in other words, the very RankEmbed training inputs Google would be forced to provide under Plaintiffs' proposal. Tr. 2831:7-24 (Allan).

c. Forced Disclosure of Training Data for GenAI Models.

661. The third provision of Plaintiffs' proposed User-side Data disclosures would require Google to give competitors "[t]he User-side Data used as training data for GenAI Models used in Search or any GenAI product that can be used to access Search." Pls.' RPFJ § VI.C.3.

662. If, for example, certain training data for AI Overviews were not captured by the RankEmbed and Glue provisions, it would be covered by Plaintiffs' GenAI training data provision, such that Google would be required to disclose essentially *all* of the User-side Data that Google has to competitors. Tr. 3520:18-21:12 (Reid).

d. Combined Effect of Forced Disclosures.

663. Under Plaintiffs' User-side Data proposal, the scope, frequency, and duration of what Google would be required to disclose to competitors compounds the loss of Google's intellectual property.

664. As Professor Allan explained, "one snapshot" of weeks or months of Glue data would provide "many, many instances of query understanding," thereby enabling the building of a query thesaurus, and "many rank[ed] lists," and "much information about clicking," and further enabling a competitor to "train a system that would be nearly identical to [RankEmbed]." Tr. 2843:5-17 (Allan).

665. Each of the "periodic" releases of data "reveals an incredible amount of information about Google," and would provide competitors with "an additional several months' worth of data that they can continue to train on," such that "every new technology that [G]oogle builds that's connected with Search is likely to be reverse engineerable out of this data." Tr. 2844:5-45:24 (Allan); RDXD-20.050-.051.

666. Competitors could also reverse engineer Google technologies by leveraging the data disclosed under multiple of Plaintiffs' proposals. Tr. 2837:17-38:9 (Allan).

667. Plaintiffs' search index proposal, for example, would require Google to disclose to competitors certain of Google's top-level stored signals, including quality and popularity measures, for each DocID in its web crawl index. Pls.' RPFJ § VI.A.3; *see supra* § V.B.2.b; Tr. 2803:10-21 (Allan) (defining top-level signals).

668. When Google's top-level signals are combined with other top-level or component sub-signals stored in the Glue or RankEmbed training data, competitors could either solve for or estimate additional top-level and component sub-signals. Tr. 2801:19-03:9, 2840:4-16 (Allan); RDXD-20.022-.023.

669. A competitor could similarly reverse engineer Google technologies by combining the RankEmbed training data from Plaintiffs' User-side Data proposal with the FastSearch results Google would be required to disclose under Plaintiffs' syndication proposal. *See infra* § V.E.2; Pls.' RPFJ § VII.A.5; Tr. 2816:23-17:12 (Allan); Tr. 3510:12-21 (Reid).

2. Plaintiffs Provide No Specifics as to How the Requested Data May Be Disclosed to Rivals While at the Same Time Safeguarding Users' Personal Privacy and Security.

670. The record evidence at trial is that there are substantial privacy problems inherent in Plaintiffs' proposed data disclosure proposals, to which Plaintiffs and their witnesses have offered no concrete solutions whatsoever.

a. Users Can Be Traced to Their Search History Even If PII Is Removed.

671. Plaintiffs' RPFJ provides that, before User-side and Ads data is shared with Qualified Competitors, "Google must use ordinary course techniques to remove any Personally Identifiable Information," defined to "mean[] an individual's Social Security Number alone; or an individual's name, address, or phone number in combination with one or more of the following pieces of information: date of birth, driver's license number or other states

identification number, or foreign country equivalent, passport number, financial account number, and credit card information." Pls.' RPFJ §§ VI.D, F; RDX0706 at .005.

672. Neither Plaintiffs' nor Google's privacy experts believe that this requirement adequately protects privacy. Tr. 1196:16-97:13, 1186:4-10 (Evans); Tr. 3680:25-81:16 (Culnane (Google Expert)).

673. Plaintiffs' privacy expert, Google's privacy expert, and industry participants agree that a user can be identified with that user's search data even if the data contains no personal identifiers. Tr. 1187:23-88:10 (Evans); Tr. 3682:8-20 (Culnane); *see also* Tr. 1063:3-22 (Schechter).

674. There are several forms of "attack" through which a third party could re-identify a search user, even through a dataset that contains no personally identifiable information. Tr. 3710:6-22 (Culnane); RDXD-29.014.

675. To take one example, a third party could attempt to recover an explicit third-party identifier from a dataset. Even where personal information is "hashed" in an effort to anonymize it, there are circumstances under which it is possible for a third party to "reverse" the hash. Tr. 3710:23-13:8 (Culnane); RDXD-29.015.

676. To take another example, a third party that receives one dataset (e.g., search records) may take that dataset and link it with another "auxiliary" dataset (e.g., publicly available social media posts or analytics data collected on a website) to shed light on common users found in each. Tr. 3713:10-15:3 (Culnane); RDXD-29.016.

677. Releasing data regarding clicked URL results heightens linking concerns because a third party who knows that a given user has visited a particular URL could use that knowledge

to determine that user's search results by identifying search results that contain the clicked-on URL. Tr. 3689:16-90:1, 3716:13-17:23 (Culnane); RDXD-29.018.

678. A third party could also single out a particular user based on time and location ("spatiotemporal") data. Tr. 3688:22-89:5, 3715:4-16:12 (Culnane); RDXD-29.017.

679. Longitudinal data, which captures multiple events for the same user, increases the risk that users may be re-identifiable. Tr. 3672:4-11, 3682:21-83:5, 3689:6-15 (Culnane).

680. Spatiotemporal data, such as the time stamps and user location in the Glue model, "has been shown to be particularly identifiable" when released in longitudinal form "because people . . . tend to, at some point, branch off on themselves and, therefore, single themselves out." Tr. 3687:22-90:10 (Culnane); RDXD-29.010.

b. Queries Cannot Be Safely Released Without Application of a Frequency Threshold.

681. Both Plaintiffs' and Google's privacy experts agree that a well-designed privacy framework must ensure that users cannot be identified from the data released. Tr. 1235:20-36:4 (Evans); Tr. 3683:6-17 (Culnane); RDXD-29.008.

682. k-anonymity is a privacy definition that is satisfied "if every record in the released data is indistinguishable from at least K minus 1 other records." Tr. 1150:1-51:3 (Evans); RDXD-29.022.

683. Frequency thresholds are used to achieve k-anonymity. k-anonymity refers to setting a threshold for the number of indistinguishable records that must appear in a dataset before it is safe to release that record. Tr. 1057:1-10 (Schechter); Tr. 1150:1-51:3 (Evans).

684. The concern would be that, if a query count falls below a preselected k-threshold, the users that submitted the query may not be indistinguishable. Tr. 3722:7-23:10 (Culnane); *see also* Tr. 1057:11-19 (Schechter).

685. Adding additional fields of data or increasing the granularity of those fields will make it harder to make users indistinguishable and achieve k-anonymity. Tr. 3691:22-92:15 (Culnane); Tr. 1156:23-57:21 (Evans) (describing how generalizing user location may allow data to be released that would otherwise be suppressed due to privacy concerns); PXRD007 at 29.

686. Frequency thresholds are especially important in the search industry because search boxes and URL results are "open text" fields, meaning that it is not possible to know in advance what content may be revealed, as a search user can type anything (no matter how sensitive) into the search box and URL results can contain date or location information. Tr. 3675:24-76:9, 3697:2-99:3 (Culnane); RDXD-29.019.

687. While Plaintiffs' expert faulted Google for the thresholds it used for purposes of providing user click-and-query data in response to the European Union's Digital Markets Act (the "DMA Search Data Licensing Program"), the data shows that the vast majority of distinct queries are lost when *any* threshold is applied. RDX0187* at .002-.005.

688. Specifically, using 2023 data, only [redacted]% of *distinct* queries (i.e., the percentage of different query strings with each distinct string counting only once) would be able to be included in a dataset with a k-threshold that required just two Google users to have issued the query over the past thirteen months globally; that number drops to [redacted]% for a k-threshold of three, [redacted]% for a k-threshold of ten, and [redacted]% for a k-threshold of thirty. Tr. 3702:19-06:16 (Culnane); RDXD-29.023; RDX0187* at .003-.005; *see also* Tr. 1191:2-92:17 (Evans) (explaining that a threshold of k=2 "probably isn't high enough").

689. The query *volume* is a different matter: using 2023 data, [redacted]% of query volume passes a k-threshold of two; [redacted]% of query volume passes a k-threshold of ten; and [redacted]% passes a k-threshold of thirty. RDXD-29.023; RDX0187* at .003-.005; Tr. 3705:2-23 (Culnane).

690. As Dr. Culnane explained, increasing the k-threshold improves privacy without materially impacting utility. Tr. 3704:21-06:15 (Culnane).

691. The algorithm proposed in Microsoft's publication, *Releasing Search Queries and Clicks Privately*, illustrates the same phenomenon: Under a range of different circumstances, Microsoft's algorithm would release only a fraction of distinct queries from its dataset—fewer than 0.80%. RDX0375 at .007, Figure 2 (showing fewer than 0.80% "[p]ercent of distinct queries" released under all considered variables); Tr. 1233:9-15 (Evans).

692. Plaintiffs' RPFJ requires Google to disclose additional fields and more precise data at potentially more frequent intervals than the DMA Search Data Licensing Program, making it more difficult to achieve k-anonymity and likely that less data could be safely released. Tr. 3690:12-92:15, 3722:7-23:10 (Culnane); RDX0700 at .005-.018 (letter attachment containing the 585 Glue input data field names); PXRD007 at 29.

693. While Plaintiffs' expert Dr. Evans suggested that Google could have released more data in the DMA Search Data Licensing Program by further generalizing the data, he did not consider the fact that Google's DMA data is already significantly generalized—for example, by providing location only at the country level and aggregating the dataset as a whole over a quarter)—nor did he consider the type of information rival search engines claim to need; in fact rival search engines wanted the data made available under the DMA to be *more* granular, not less. Tr. 3812:18-14:13 (Culnane); Tr. 1234:15-18 (Evans).

694. Dr. Evans confirmed that frequency-based methods are required to protect the query string; his testimony with respect to what he called "differential privacy noise" was that noise could be added to the *statistical* data that accompanies the query strings (i.e., numerical,

non-open-text data such as query counts and click counts). Tr. 1169:9-70:1, 1142:12-43:7, 1210:18-12:10 (Evans); PXRD007 at 38.

695. The mechanisms conventionally used to satisfy differential privacy do not allow for unrestricted open-text data to be safely released because such data is often distinguishable and cannot be protected by adding randomized noise. Tr. 3727:11-28:11 (Culnane); Tr. 1151:17-52:11 (Evans).

696. Accordingly, even if randomized noise is added, frequency thresholds must also be applied to safely release open-text search queries. Tr. 1169:9-71:7 (Evans) ("[I]n order to identify the set of queries that you release statistics on, it makes sense to look at frequency-based methods."); Tr. 3718:11-19:12 (Culnane).

697. The Microsoft paper is an example of the release of open-text data with a differential privacy guarantee; the researchers used frequency thresholds in combination with noise. RDX0375 at .001-.002, .009; Tr. 1151:7-53:20 (Evans); Tr. 1062:9-13 (Schechter).

698. Google's expert Dr. Culnane testified that, had Google implemented a differential privacy strategy in connection with the Digital Markets Act, a *higher* proportion of distinct queries would be removed from the set because differential privacy is a "much stronger definition of privacy," requiring "a much higher threshold" in order to get a low enough probability of privacy failure (i.e., a low enough delta—the probability that the differential privacy guarantee will not be met). Tr. 3720:6-15, 3721:18-22:6 (Culnane).

699. With respect to frequency thresholds, Dr. Evans's testimony is not that they can be avoided, but rather that there may be ways to further generalize and categorize queries such that more queries can pass the threshold. Tr. 1158:17-60:20 (Evans).

700. As stated above, however, Dr. Evans did not take into account that rival search engines have sought further specificity and additional fields—not more generality and aggregation. *See supra* ¶ 698.

701. None of the applications of differential privacy that Dr. Evans identified involved unbounded open-text queries or combined differential privacy and k-anonymity in the manner proposed by Dr. Evans. Tr. 3727:11-79:6 (Culnane).

702. Google's expert, Dr. Culnane, explained that combining differential privacy and k-anonymity would only be appropriate if the data protected by k-anonymity were released separately from the data protected by differential privacy. Tr. 3725:2-26:20 (Culnane).

703. In this scenario, Qualified Competitors would have the query string and metadata showing user behaviors, but two data sets would be separate, and so one could not decipher what queries prompted the user behavior. Tr. 3725:2-26:20 (Culnane).

c. Balancing Privacy Against Utility in a Data Disclosure Regime Is Ultimately a Policy Determination That Plaintiffs Propose to Delegate to the Subjective Judgment of a Private Technical Committee.

704. There is an inherent trade-off between protecting user privacy and preserving the utility of the data, and any disclosure of data will incur some degree of privacy cost. Tr. 1166:22-69:8 (Evans); Tr. 3676:24-78:18 (Culnane); Tr. 1064:14-65:20 (Schechter).

705. Because of this inherent and unavoidable privacy cost, data should only be released if it can be shared in a manner that satisfies the privacy requirements and provides sufficient utility. Tr. 3677:2-78:18 (Culnane); RDXD-29.004.

706. While Plaintiffs' expert Dr. Evans touted the existence of formal definitions of privacy, he acknowledged that the extent to which privacy is actually protected depends on the

parameters selected—and he offered no opinion as to what those parameters should be. Tr. 1146:24-48:14, 1201:13-20 (Evans).

707. Dr. Evans offered no opinion as to whether or how Google could disclose "long-tail" queries while still protecting user privacy. Tr. 1233:16-24 (Evans).

708. Plaintiffs submitted no other expert evidence, such as from an industry expert, regarding the utility of data that could be disclosed after applying necessary privacy protections.

709. Nor did Plaintiffs provide their privacy expert with any assumed use case. Tr. 1170:2-71:7, 1200:20-01:20, 1221:6-22 (Evans).

710. Plaintiffs' RPFJ vests responsibility for selecting privacy safeguards with Plaintiffs, "in consultation with" the Technical Committee. RDX0706 at .005.

711. Plaintiffs' RPFJ does not contain standards as to how the Plaintiffs would select the appropriate privacy requirement or determine how to balance privacy against utility.

712. Plaintiffs' RPFJ places no meaningful constraint on the Plaintiffs' discretion to decide how to strike the balance between privacy and utility. *See infra* ¶¶ 729-31.

713. In Dr. Evans's view, when it comes to selecting the trade-off between privacy and utility, "there's no absolute rules," "there's no universal agreement," and the considerations will vary depending on the "use case" for the data. Tr. 1145:2-48:14 (Evans).

714. Dr. Evans expects that "different qualified competitors will have different uses that they want," which presents "the kind of issues that could get complicated," but suggests the Technical Committee "can do experiments to measure how well the use case is achieved under different ways of implementing the privacy protections." Tr. 1170:2-71:7 (Evans); *see also* Tr. 1168:13-69:1 (Evans).

715. Microsoft's Vice President of Bing Growth, Michael Schechter, testified that the privacy concerns associated with disclosing long-tail queries are "not made up" and that Microsoft "would be concerned with that." Tr. 1064:10-65:20 (Schechter) ("THE COURT: How does one reconcile those two considerations; that is, to improve in long tail queries; that is, having a database or having data about unusual or unique queries with preserving the anonymity and creating some sort of k-threshold or -- k-threshold under which you have concerns about anonymity . . . . A. I think the privacy concerns are very -- are not made up; like, we would be concerned with that. Microsoft cares about privacy. I believe Google too as well.").

716. Mr. Schechter's testimony also highlights that, even for reasons not wholly related to privacy, there are limits on the extent to which a data disclosure proposal would be useful. Because there is no guarantee that "Google even logs the same signals [Microsoft] might use for relevance," it is "much more valuable for [Microsoft] to see the users than to have them proxied through privacy filters through data sharing." Tr. 1064:10-65:20 (Schechter).

d. Plaintiffs' Data Disclosure Proposals Raise Serious Security Risks.

717. The data disclosure provisions of Plaintiffs' RPFJ raise a number of security-related concerns, including because "search query data is of a very high sensitivity in terms of its content" and must be protected "relative to the kinds of threats it might face." Tr. 2338:4-16 (H. Adkins (Google)).

718. Google has developed a culture and built processes specifically to defend against attacks targeting the data subject to disclosure under the RPFJ. Tr. 2390:6-17 (H. Adkins).

719. Qualified Competitors that were once a small target for hackers or other attackers will instantly become key targets upon receiving Google's data. Tr. 3522:7-18 (Reid).

720. These risks are far from speculative. Established companies—including Qualified Competitors who would presumably obtain access to Google's search data in this case—have repeatedly failed to protect their systems from malicious actors. Tr. 2328:14-29:13, 2330:6-31:2, 2332:22-33:6 (H. Adkins); Tr. 1072:19-75:7 (Schechter).

721. Faced with limited resources and expectations to develop products quickly, new competitors would in particular struggle to prevent hackers from stealing disclosed data. Tr. 2332:5-21 (H. Adkins).

722. Plaintiffs' RPFJ does not specify "the security practices that would be necessary for the third party to implement," so there is no assurance that the data will be sufficiently protected by third parties. Tr. 2338:11-39:3 (H. Adkins).

723. Moreover, Qualified Competitors do not have the same infrastructure as Google to protect user data, but the infrastructure that Google has built to protect search data is "really the bar you have to set" to protect users. Tr. 2338:11-39:3 (H. Adkins); *see also supra* § III.D.2.

3. The Required Disclosures Would Negatively Impact User Trust.

724. Google has earned the trust of users who in turn rely on Google in "their most vulnerable moments" by keeping its promise to users that Google "will keep their queries really safe." Tr. 2465:16-25 (Pichai); Tr. 3521:13-23:3 (Reid).

725. Consistent with that promise, Google strictly limits access to user data, even internally, and has never voluntarily disclosed User-side Data to third parties. Tr. 3517:16-19, 3526:14-27:7 (Reid); RDX0035*.

726. If Google is required to share sensitive queries with third parties, Google can no longer protect the data once it is released, which "is likely to pretty meaningfully affect users' trust." Tr. 2521:13-23:3 (Reid).

727. Plaintiffs' proposals, for their part, in no way provide for Google to seek user consent before handing over user data to rivals.

728. Google also promises to delete user data (including their search queries) upon user request. Tr. 3526:14-27:7 (Reid); Liability Tr. 9013:20-14:19 (Fitzpatrick (Google)).

729. But, if forced to disclose queries and other user information to Qualified Competitors, Google has no way to ensure that this user data is deleted. Tr. 3527:3-7 (Reid) ("But if you hand that data over, then if a user deletes the data, it still exists, it exists in somebody else's hands, and there's no way for us to ensure that others are deleting it in any reasonable time frame or at all.").

730. Despite its unique institutional knowledge and successful record of protecting user data from attacks, the Plaintiffs' RPFJ does not afford Google any discretion in selecting the so-called "security and privacy safeguards" that will purportedly protect users upon Google releasing their data. Pls.' RPFJ § VI.D.

731. In fact, Plaintiffs clarified in their Interrogatory Responses that Plaintiffs—not Google—will select the privacy and security safeguards. RDX0706 at .005-.006 (the RPFJ was "not intended to allow Google to unilaterally choose any particular method, including frequency thresholds, to remove Personally Identifiable Information from data shared with Qualified Competitors beyond the data [that Plaintiffs define as "PII"]. Paragraphs VI.D and VI.F require Google to follow any security and privacy safeguards *as determined by the Plaintiffs in consultation with the Technical Committee*, which may include frequency thresholds." (emphasis added)).

D. The Ads Data Disclosure Proposal Would Deprive Google of Its Innovations, Expose Sensitive User and Advertiser Data, and Harm Competition.

732. Sections VI.E and VI.F of Plaintiffs' RPFJ require Google to disclose to Qualified Competitors the "Ads Data used to operate, build or train AdBrain models or other models used in Ads targeting, retrieval, assessing ad relevance, bidding, auctioning (including predicted click-through rates (pCTR)), formatting, or content generation." Pls.' RPFJ §§ VI.E, F.

733. This broad provision encompasses the data used in every model Google employs during the "life cycle of an ad," from the creation of the ad, to the bidding and targeting of the ad, to the matching of the ad to the user's search query, and finally to the appearance of the ad on Google's search results page. Tr. 4401:17-04:24 (Muralidharan).

734. Requiring Google to disclose this massive breadth and depth of ads data not only risks the privacy of user data, the confidentiality of advertiser data, and the quality of Google's ads, but also exposes Google's intellectual property.

1. Plaintiffs' Proposal Would Expose Sensitive User Data to Countless Third Parties.

735. The ads data disclosure requirements in Plaintiffs' RPFJ Section VI.E implicate the same user data that must be disclosed under Section VI.C. The Ads Data, however, includes longer periods of users' historical clicks and queries, additional metadata on the user, and conversion data—each of which multiplies the risks to user privacy. Tr. 3692:19-94:1 (Culnane); *see supra* ¶¶ 679-80.

736. The RPFJ requires Google to disclose all Ads Data, defined as "data related to Google's selection, ranking, and placement of Search Text Ads in response to queries, including any User-side Data used in that process." Pls.' RPFJ § III.A.

737. Google utilizes user data in its ads models, including users' historical click and query data. Tr. 4406:20-08:22 (Muralidharan); Tr. 3692:19-93:17 (Culnane); *see supra* § V.C.

738. One such database for user data is FLOGs. Although this data does not include a structured user identifier, it maintains users' historical search queries and historical clicks on URLs. Tr. 4411:12-12:6 (Muralidharan); RDX0011* at .003. Since FLOGs contains multiple events from users, it constitutes longitudinal data. Tr. 3688:16-90:10 (Culnane).

739. FLOGs also includes numerous other metadata including (but not limited to) user agent string, time stamps, location, inferred demographics, and other "[s]table high cardinality features" which are constant for a given user over a period of time and could allow the singling out of a user. RDX0011* at .002-.003.

740. Within Google, the ads organization imposes strict access requirements on databases like FLOGs, and Google employees are prohibited from joining FLOGs with any dataset that contains strong identifiers due to the "re-identification risk[s]." RDX011* at .004-.005; *see also* RDX0036*.

741. The database Google uses to serve personalized ads, which is named Kansas, stores data at the individual user level and organizes each user's historical clicks and queries according to a user ID. Tr. 4412:7-16 (Muralidharan).

742. Therefore, the data in Kansas is longitudinal in that it includes each user's chronological search and click history. Tr. 4412:20-13:12 (Muralidharan); Tr. 3688:16-90:10 (Culnane). Kansas also includes metadata associated with the user such as time stamps, user location, user device, user language, inferred and derived characteristics of the user, and many other types of metadata. Tr. 3692:19-93:17 (Culnane); RDXD-29.012; RDXD-34.007.

743. Unlike the User-Side Data at issue in RPFJ Section VI.C, the Ads Data also includes conversion data. Tr. 4407:21-09:24 (Muralidharan).

744. Conversion data is typically collected by the advertiser—for instance, when a user visits a website owned by an advertiser, the advertiser may send a conversion ping to Google (even if the user did not reach the website by clicking on an ad on Google's SERP). Tr. 4408:23-09:24, 4410:9-11 (Muralidharan).

745. Advertisers share many other types of conversion data with Google as well, such as customer lists and user app downloads, or data on when a user adds an item to her online shopping cart, makes a purchase, books an appointment, provides contact information to the advertiser, or interacts with the advertiser in any other manner the advertiser prescribes. Tr. 4407:21-08:22, 4415:1-16:13 (Muralidharan); *see also* Tr. 2971:8:23 (J. Adkins).

746. Conversion data is "granular" and creates a "detailed record" of what the user has done. Tr. 4407:21-08:22 (Muralidharan); RDXD-34.007; *see also* Tr. 3692:19-93:17 (Culnane) (explaining that disclosing conversion data "adds considerably more information about each user because you are now no longer just capturing information about their behavior on Google, you are capturing the information about what they've done when they went to the targeted advertiser").

747. Because the Ads Data is longitudinal and includes extensive user metadata, there are increased risks that users could be re-identified. Tr. 3682:21-83:5, 3691:22-92:15 (Culnane); *see also* Tr. 4412:20-13:12 (Muralidharan).

748. The highly sensitive user information Google would be compelled to disclose under RPFJ Section VI.E would be available to Qualified Competitors, including some competitors that "could . . . be started for the purpose of getting access to this data." Tr. 4406:4-14 (Muralidharan).

2. Plaintiffs' Proposal Would Harm Advertisers by Disclosing Their Sensitive Business Data Without Their Consent.

749. Advertisers provide their own extensive confidential data to Google so that Google can create ads, serve ads, and report back on the ads' performance. Tr. 4415:1-16:13 (Muralidharan) (explaining that advertisers provide campaign information such as ad copy and ad assets, targeting information such as the keywords, users, and locations they want to advertise with, as well as bid and budget information, including financial goals and return on investment objectives); RDXD-34.008.

750. As previously mentioned, advertisers also provide conversion data to Google to receive information on whether their ads provided value and achieved their advertising goals. Tr. 4407:21-08:22 (Muralidharan).

751. Dr. Muralidharan explained that advertisers are "very protective" of conversion data because it is sensitive business performance information; advertisers provide conversion data to Google only to the extent they can obtain sufficient value in return. Tr. 4419:6-14 (Muralidharan) ("[A]dvertisers are naturally reluctant to give over this super-precious confidential data to us."); *see also* Tr. 2971:9-23 (J. Adkins).

752. Advertisers often provide Google with conversion data and information on business targets because Google's automatic bidding systems can take the advertiser's inputted financial goals and automatically determine the optimal bid for each ad auction, depending on the value of each specific user's query. Tr. 4415:1-16:13 (Muralidharan) ("[B]ecause of the rise of automation in all of these products, it's less that the advertiser is giving us a very detailed instruction on what to do and more telling us what they want to accomplish. So it's actually . . . more tightly integrated into their business and their business goals . . . .").

753. Google's advertiser data is sensitive because it provides "a really clear window into their business[es]." Tr. 4418:10-19:5 (Muralidharan). For instance, third parties could derive or even directly access competitive information from the advertiser data, such as the amount of online traffic the advertiser receives, their customer acquisition costs, and their marketing strategies, supply chain value, and overall business health. Tr. 4418:10-19:5 (Muralidharan); Tr. 2970:17-71:8 (J. Adkins).

754. This advertiser data is "very granular . . . and nuanced." It would be extremely valuable to the advertiser's competitors as it constitutes an enormous amount of data that could provide a competitive edge. Tr. 4418:10-19:5 (Muralidharan).

755. For instance, Dr. Israel explained that under Section VI.E of the RPFJ, Google would be compelled to share all of Walmart's Google Ads information, including bids, budgets, and conversions, with any Qualified Competitor. Tr. 3204:10-17 (Israel).

756. Dr. Israel testified that Amazon, which already sells search ads, could become a Qualified Competitor in the *general* search text ad market. In this scenario, all of Walmart's Google Ads information would go to Amazon, which competes directly with Walmart in the online retail market. Dr. Israel emphasized that the RPFJ implicates "a lot of information that's being taken out of the control of . . . advertisers." Tr. 3198:19-24, 3204:10-05:10 (Israel); *see also* Tr. 4406:4-14 (Muralidharan) (testifying that some firms may enter the relevant market "for the purpose of getting access to this data").

757. Mr. Adkins added that if advertisers' "sensitive proprietary bid information" was shared with third parties, there is a risk that this valuable information could be resold and further exposed. Tr. 2970:17-71:8 (J. Adkins).

758. Google does not disclose this advertiser data without advertiser consent. Tr. 4420:25-21:12 (Muralidharan); RDX0130* at .005; RDX0132* at .004.

759. Compelling Google to expose advertiser data under the RPFJ would contravene Google's obligations to prevent any disclosure of advertiser data without explicit advertiser approval. Tr. 4420:25-21:12 (Muralidharan); *see also* RDX0130* at .005 (Google Analytics Terms of Service stating that Google will not share the advertiser's customer data without consent); RDX0132* at .004 (Google Ads API Policies stating that any ad agency managing Google ads on behalf of an advertiser must obtain the advertiser's consent before disclosing "data specific to their Google Ads accounts (including keywords, bids, campaign settings, or performance data)").

3. Plaintiffs' Proposal Would Deprive Google of Its Intellectual Property.

760. With the massive breadth and depth of Ads Data that Google is compelled to disclose under Plaintiffs' RPFJ, Qualified Competitors and advertisers would be able to reverse engineer Google's intellectual property.

761. Plaintiffs' RPFJ Section VI.E requires Google to disclose whether an ad is shown on each user query, which ad is shown, and all the information contained in the ad. Tr. 4422:24-23:18 (Muralidharan).

762. Third parties would be able to use distillation, a "standard industry practice," to mimic Google's search ads algorithms. Distillation is the practice of training a machine learning model by feeding it "a stream of examples" from a large teacher model—in this case, the data that rivals are receiving from the compelled disclosures. Tr. 4423:19-24:11 (Muralidharan).

763. With enough data from the teacher model, the smaller model can "mimic the behavior of Google." Tr. 4423:19-24:11 (Muralidharan).

764. Once this data is shared, there are no technological safeguards to prevent distillation. Tr. 4424:12-20 (Muralidharan).

765. Google's policies explicitly prohibit third parties from scraping Google's ad results or ads data. *See, e.g.*, RDX0131* at .001; RDX0132* at .006. Microsoft's policies contain the same sorts of prohibitions. RDX0317 at .001 (Microsoft's ad policy "has a long-standing provision prohibiting the use of the Bing results to train another service").

766. Additionally, RPFJ Section VI.E would require Google to disclose more than the raw advertiser and user data that is used in each of the ad models used to "operate, build or train AdBrain models or other models used in Ads targeting, retrieval, assessing ad relevance, bidding, auctioning (including predicted click-through rates (pCTR)), formatting, or content generation." Tr. 4424:23-25:20 (Muralidharan); Pls.' RPFJ § VI.E.

767. Specifically, Plaintiffs stated in an interrogatory response that Google must disclose any Ads Data "serving as inputs into the components of Google's Auction and Prediction stack." RDX0706 at .006.

768. Some of these inputs include the outputs of other Google ads models—for instance, one Google ads model predicts whether a user is looking for a specific result, and the output of that algorithm is then fed into other prediction models at issue in Plaintiffs' RPFJ. Tr. 4424:23-25:20 (Muralidharan). Additionally, some internal proprietary organic search signals are input into Google's ads models and would also be disclosed. *Id.*

769. In these instances, Dr. Muralidharan explained that disclosing the intermediate inputs into the ads models would "expose Google's intellectual property" because it would be "directly sharing the model." Tr. 4425:17-20 (Muralidharan).

4. The Forced Disclosure of Ads Data Would Diminish the Quality of Search Ads.

770. Due to the highly confidential nature of the advertiser data that must be disclosed under Plaintiffs' RPFJ, advertisers will likely provide less data to Google, which would inhibit Google's ability to serve ads, harming advertisers and users. Tr. 4419:20-20:14 (Muralidharan).

771. As a preliminary matter, some of the sensitive advertiser data Google would be required to disclose under Plaintiffs' RPFJ (such as the advertiser's keywords and bids) is critical to run the auction and serve ads. Tr. 4403:3-04:6 (Muralidharan). Advertisers would "naturally become much more reluctant to share" their data with Google, which would negatively affect Google's search ads business. Tr. 4419:20-20:14 (Muralidharan); Tr. 2970:17-71:8 (J. Adkins).

772. Additionally, Google offers automated bidding algorithms to advertisers, which allows the advertiser to set a goal such as specifying a percentage of return on ad spend. Advertisers report back conversion data to Google, and Google determines whether the advertisers' customers and their associated spend can be attributed to clicks on Google ads. Based on this data, Google's autobidding models determine how much the advertiser should bid on each user query. Tr. 4416:15-18:6 (Muralidharan).

773. Dr. Muralidharan explained that "autobidding aligns the interests between the advertiser, user and Google" in that the algorithms can optimize the advertiser's bid based on the value of the user query, taking into account "all the dimensions that might be relevant to valuing a click." Tr. 4419:20-20:14, 4416:15-18:6 (Muralidharan).

774. By combining advertisers' data and Google's expertise, Google can deliver the best performance to the advertiser, which is why the vast majority of advertising spend at Google occurs through autobidding today. Tr. 4416:15-18:9 (Muralidharan).

775. Advertisers' performance would suffer if they could no longer provide conversion goals or data to utilize these autobidding models, for fear that this sensitive data would be shared with third parties. Tr. 4416:15-18:9, 4419:20-20:14 (Muralidharan).

776. As a result, users would be worse off because they would receive ads of lower relevance. Tr. 4416:15-18:9, 4419:20-20:14 (Muralidharan).

777. Additionally, because complying with Plaintiffs' RPFJ would expose Google's intellectual property, Google would be disincentivized from improving any aspect of the ads system, as those breakthroughs would soon be copied by competitors. Tr. 4452:2-53:4 (Muralidharan). As a result, the pace of Google's innovation in ads would certainly slow, to the detriment of users and advertisers. Tr. 4453:5-8 (Muralidharan).

5. Compelled Disclosure of Google's Ads Data Would Not Benefit Competition in the Market for Search Text Ads.

778. Dr. Israel testified that competition between GSEs boils down to competition for queries. Therefore, user-side remedies readily address competition in both general search and search text advertising. Tr. 3191:15-93:5 (Israel) (explaining that once a GSE has "won a query, both they've won the user and advertisers follow the queries").

779. Whichever search engine "wins the user has won the opportunity to sell ads against that query." Tr. 3193:9-96:1 (Israel). Accordingly, the record demonstrates that "the share of the ad dollars matches the share of the queries quite closely." *Id.*

780. Any additional advertising remedies which go beyond competition for user queries would "reduce investment incentives," "generate legal and enforcement costs," "undermine the competitive process in advertising," and "undermine Google's ability to protect users and advertisers." Tr. 3193:9-96:1 (Israel).

781. Dr. Israel further explained that there is scant record evidence that the quality of ad results influence competition for user queries, as opposed to largely relying on the quality of organic search results. Tr. 3196:4-97:12 (Israel).

782. Notably, Google only shows ads on 20% of queries, and even fewer of those queries result in ad clicks. Tr. 4623:4-12 (Chipty). Plaintiffs and their experts have not offered any evidence on whether the small percentage of commercial queries that show ads are tail queries or whether search engine rivals have sufficient scale to serve high-quality ads to users.

E. Forced Syndication of Google's Search Results, Features, and Underlying Signals Would Strip Google of Its Proprietary Assets and Intellectual Property and Degrade the Search Experience.

783. Plaintiffs' syndication proposals would require Google to syndicate to competitors, via a real-time application programming interface ("API") and at marginal cost, not only its ranked organic search results but also a number of popular search features, together with an identification of (i) Google's query understanding information and (ii) every feature Google would display in response to the query and its relative ranking. Pls.' RPFJ §§ VII.A.1-5.

784. *First*, Google would be required to syndicate "[d]ata sufficient to understand the layout, display, slotting, and ranking of all items or modules on the SERP, including but not limited to the mainline content and sidebar content and sitelinks and snippets." Pls.' RPFJ § VII.A.1.

785. "[D]ata sufficient to understand" encompasses "both the relative ranking of the SERP module or feature itself as compared to other SERP modules or features appearing on the SERP, and the ranking of content or results within the SERP module or feature itself for [Local, Maps, Video, Images, and Knowledge Panel]." RDX0706 at .003-.004.

786. Thus, Section VII.A.1 requires that Google identify not only which features should be triggered in response to a query and where on the SERP they should appear—that is,

Google's "Tangram information"—but also what information appears inside each feature and how it is ranked, including, for example, what images appear within an image carousel and the order of those images, or "the zoom-out level of the map" on the SERP. Tr. 2814:4-15:22 (Allan); Tr. 3481:1-82:6, 3490:1-91:3 (Reid) ("[Y]ou're sharing all of the IP we've developed on a per-vertical basis for the verticals or features described in VII.A.4. . . . And so it's not just the ranking of the units themselves, the IP around that, but it's the IP of the individual units that we're sharing.").

787. *Second*, Google would be required to syndicate its "[r]anked organic search results obtained from Google database or index, regardless of whether such web content was obtained by crawling the Internet or by other means." Pls.' RPFJ § VII.A.2.

788. Section VII.A.2 includes what is traditionally referred to as the "ten blue links," and more broadly refers to "all parts of a [SERP] that aren't ads," which includes "the ranking of the web results, as well as the ranking of units" on the SERP. Tr. 3492:15-93:8 (Reid).

789. *Third*, Google would be required to syndicate its "[s]earch features that enable query corrections, modification, or expansion like spelling, synonyms, autocomplete, autosuggest, related search, 'did you mean,' 'people also ask,' and any other important query rewriting features identified by the TC." Pls.' RPFJ § VII.A.3.

790. "Search features that enable query corrections" contemplates "both user facing query correction, as well as query rewriting models that are not user facing," and the list of features Plaintiffs enumerate in Section VII.A.3 "is not exhaustive," as "the Technical Committee may identify, with Plaintiffs' endorsement, further important query rewriting features." RDX0706 at .004; Tr. 3434:4-8 (Reid).

791. Thus, Section VII.A.3 would require Google to syndicate its proprietary "back-end query understanding systems," which include Google's "semantic understanding" of a query, along with "a set of ranking signals" associated with Google's efforts to interpret user queries—efforts based on the work of hundreds of Google engineers. Tr. 3496:4-98:17 (Reid).

792. *Fourth*, Google would be required to syndicate its "Local, Maps, Video, Images, and Knowledge Panel search feature content." Pls.' RPFJ § VII.A.4.

793. Under this requirement, Google would need to provide "both information sufficient to understand the module or feature as it appears to the user on the search engine results page and information sufficient to produce what is shown to the user once a user has clicked on that module or feature." RDX0708 at .004.

794. Google would thus have to syndicate the diverse content displayed when users click on Local, Maps, Video, Images, and Knowledge Panel search features, thereby worsening Google's intellectual property exposure and compliance burden. Tr. 3500:12-03:10 (Reid).

795. *Fifth*, Google would be required to syndicate its "FastSearch results (fast top organic results)." Pls.' RPFJ § VII.A.5.

796. "FastSearch results" refers to a limited set of results quickly retrieved from "fast" sources like RankEmbed, allowing Google to generate ranking for a variety of use cases much faster than ordinary retrieval. Tr. 3509:21-10:11 (Reid).

797. For each of the above provisions, Sections VII.A.1-5, the information Google would be required to provide "must be the same as if the Qualified Competitor's query had been submitted through Google.com." Pls.' RPFJ § VII.A.

798. Under Plaintiffs' proposals, Google would be prohibited from imposing any restrictions on competitors' use, display, or interoperability with Search Access Points, including

of GenAI products, with only limited exceptions for "reasonable steps to protect its brand, its reputation, and security." Pls.' RPFJ § VII.B; *see also* Pls.' RPFJ § VII.F.

799. As further described below, Plaintiffs' syndication proposals would directly disclose many Google technologies and would allow competitors to reverse engineer not only Google's search results but also additional proprietary Google technologies. Tr. 2780:23:81-11, 2817:14-19:5 (Allan); *see infra* §§ V.E.2-3 (identifying Google technologies directly disclosed or that competitors could reverse engineer under Plaintiffs' syndication proposals).

800. The ongoing disclosures over a ten-year period envisioned by Plaintiffs' syndication proposals would reveal and allow a competitor to reverse engineer future Google technologies and additional current Google technologies. Tr. 2781:12-15 (Allan); *see infra* ¶¶ 619-20, 663-65, 875 (describing compounding harms of ongoing disclosures under Plaintiffs' syndication proposals).

801. In short, Plaintiffs' syndication proposals would provide rivals with the use of, and substantial insight into, Google's proprietary technologies at each stage of Google's search stack, which collectively reflect a tremendous amount of Google's innovation and investment. Tr. 3432:18-21 (Reid); Tr. 2784:1-6 (Allan).

1. Plaintiffs' Proposal Would Compel Syndication on Terms That Are Incompatible with Ordinary Commercial Practices.

a. Google Syndicates Its Search Results and Select Search Features Only Under Specific Circumstances.

802. Given the degree of investment and innovation Google's search results and features reflect, Google syndicates only a subset of them, under specific contractual restrictions, and subject to various know-your-customer considerations. Tr. 3502:8-23 (Reid); Tr. 2994:24-95:2, 2996:1-25, 2998:15-24 (J. Adkins).

803. Programmable Search Engine (ProSE), Google's publicly available syndication product, comes in several versions. As relevant here, the server-to-server interface that only returns web results has a 10,000 query-per-day cap. Tr. 3001:2-25 (J. Adkins).

804. Google caps the number of queries for which it will return ProSE results to limit the exposure of its intellectual property to ProSE customers. Tr. 2996:8-20 (J. Adkins).

805. All ProSE customers agree to abide by its terms of service, which explicitly forbid reverse engineering as well as scraping, indexing, crawling, or "in any non-transitory manner" storing or caching Google's syndicated search results. Tr. 2996:21-97:11 (J. Adkins) (identifying Sections 1.4(j)-(m) of the ProSE terms of service as "contractual restrictions . . . on what a syndication partner may do with respect to the results it receives from Google"); RDX0046 at .003 ("Programmable Search Engine Terms of Service").

806. Web Search Syndication (WSS) is Google's directly negotiated syndication option. Tr. 2995:9-16 (J. Adkins).

807. Like the ProSE terms of service, the agreements governing Google's WSS relationships similarly provide that the syndication partner may not: "'crawl', 'spider', index or in any non-transitory manner store or cache information obtained from the Services (including Results)." RDX0420 at .007 ([redacted] agreement); Tr. 2998:3-14 (J. Adkins); *see also* RDX0401 at .009 ([redacted] agreement); RDX0405* at .006 ([redacted] agreement).

808. Across ProSE and WSS, Google places a variety of contractual restrictions on how its syndication customers and partners can use its results. Tr. 3478:24-79:17 (Reid) ("[O]ur syndication APIs have restrictions that allow you to display the results to the users. But you can't use them to build a competitive search engine, you can't store them, you can't analyze them, you can't learn from them. They're intended to be purely for the purpose of serving.").

809. The nature and extent of Google's WSS relationships serve as an additional check on the risks to Google's intellectual property. Tr. 2998:15-24 (J. Adkins).

810. For each of these directly negotiated partnerships, Google has an account manager and an established "know your customer" relationship, such that Google knows the partner's business and has some ability to monitor the partner. Tr. 2998:15-24 (J. Adkins).

811. Generally, the APIs Google offers for search syndication provide only the web search results (i.e., the ten blue links), a related search unit, and, for certain queries, an autocorrect or spell correct functionality, which together amount to "a very small subset of the features that appear on Google.com." Tr. 2999:9-17 (J. Adkins); Tr. 3478:24-79:17 (Reid).

812. Google's syndication APIs do not allow for the same functionality as provided on Google.com, which Plaintiffs' syndication proposals would require. Tr. 2999:6-11 (J. Adkins); Tr. 3478:24-79:17, 3490:1-91:23 (Reid).

813. Google does not syndicate the vast majority of its search features due to the initial and ongoing technical costs involved with syndicating constantly evolving feature units, in addition to the intellectual property concerns discussed below. Tr. 3507:19-08:13, 3488:22-89:24, 3502:8-03:10 (Reid).

814. For example, although Google provides an Image Search syndication API to select partners, that product does not allow for the same functionality as is provided on Google.com. It returns only a list of relevant thumbnail images; it does not provide the interactive interface available on Google's Image Mode, which allows for visual query refinements, browsing, and other interactive behavior. Tr. 2999:18-3000:6 (J. Adkins).

815. As part of a unique, fifteen-year-old partnership, Google syndicates its web search results, image thumbnails, and a limited subset of its Knowledge Panel information to Yahoo

Japan for use in the Japanese market. Tr. 2995:17-25 (J. Adkins); *see* PXR0598 (2010 Google Services Agreement with Yahoo Japan).

816. As with Google's ProSE terms of service and WSS agreements, the Yahoo Japan agreement provides that Yahoo Japan may not "use . . . cached Search Results Sets to build its own search index or any substitute version of the Search Services, nor to carry out any form of reverse engineering," and may not "reverse engineer" using the "Google materials"; in addition, there are limits on both the frequency with which Google provides certain data and on how long such data may be kept. PXR0598 at -723 (§ 2.7(b)(iv)), -726 (§ 2.9(a)(ii)), -734 (§ 9.4(b)).

817. Each of the provisions unique to Google's partnership with Yahoo Japan is narrowly circumscribed by other contractual restrictions, and the agreement contains notable exceptions discussed below. Tr. 3112:16-18 (J. Adkins); PXR0598 at -723-724, -726-729.

818. Although Section 2.7(c) allows Yahoo Japan "to submit machine generated queries in order to scrape the sections of Google's Japanese Sites," this provision is limited in both scope and purpose. As to scope, Yahoo Japan is limited to a very low, agreed-upon number of such queries. And as to purpose, the results Google agrees to provide in response to these queries are for the specific purpose of allowing Yahoo Japan to give *Google* feedback on *its* results so that Yahoo Japan can better comply with local Japanese law, including as related to adult content, and accounting for Japanese language differences. Tr. 3109:16-24, 3111:21-12:15 (J. Adkins); PXR0598 at -723.

819. Similarly, although Yahoo Japan "may cache Search Result Sets" under the terms of the agreement, it may do so "for the sole purpose of reducing server and network latency," and subject to the requirement that it "not use such cached Search Results Sets to build its own

search index or any substitute versions of the Search Services, nor to carry out any form of reverse engineering." PXR0598 at -723 (§§ 2.7(b), (b)(iv)); Tr. 3113:8-14:23 (J. Adkins).

820. Section 2.9 of the Yahoo Japan agreement, under which Google previously provided Yahoo Japan with certain data from its Japanese-language web crawl index on a periodic basis, was amended in 2018. Tr. 3114:24-15:12 (J. Adkins); RDX0403 (2018 amendment to Yahoo Japan agreement); RDX0403A (English translation of 2018 amendment).

821. Pursuant to that amendment, Google now provides only the language, adult content identifier, and spam score to Yahoo Japan. Tr. 3116:6-17:7 (J. Adkins); RDX0403 at .001; RDX0403A at .001.

822. That information is provided concurrently with the call for syndicated web results, and thus is specific to the particular web results Google is returning, not information for all of the Japanese-language documents in Google's index. Tr. 3116:6-17:7 (J. Adkins).

823. This information Google provides is intended to assist Yahoo Japan in evaluating the syndicated Google results for spam or adult content. Tr. 3117:8-19 (J. Adkins).

824. Similarly, although the Yahoo Japan agreement lists various search features that Google was to make available to Yahoo Japan as of the agreement's 2010 launch date, the agreement also sets out a variety of exceptions to those provisions. Tr. 3118:2-21:13 (J. Adkins); PXR0598 at -727-729 (§§ 5.1(a)-(c)), -752-755 (App'x 3).

825. Section 5.1(b)(i) provides an exception for any provision of search features or data that would violate Google's privacy policy or otherwise involve disclosure of Google users' personal information to Yahoo Japan. Tr. 3118:23-19:7 (J. Adkins); PXR0598 at -728.

826. Section 5.1(b)(ii) provides an exception where provision of certain search data or features "would result in a substantial increase in [Google's] engineering costs." Tr. 3119:8-20 (J. Adkins); PXR0598 at -728.

827. Section 5.1(b)(iii) provides an exception for situations where syndicating the feature itself would risk exposing Google's trade secrets. Tr. 3119:21-20:4 (J. Adkins); PXR0598 at -728 (retaining Google's right to restrict provision of search data to extent it is "of a highly sensitive and proprietary nature which by its nature must retain a high level of secrecy to enable the proper functionality, value or efficacy of the applicable Search Service (including specific confidential algorithms used to determine search results)").

828. Section 5.1(b)(iv) provides an exception for search data subject to "distribution limitations imposed by third party content providers in Google's agreements," such that Google need not sub-syndicate such data. PXR0598 at -728; Tr. 3120:5-18 (J. Adkins).

829. Section 5.1(b)(v) provides an exception for search data "available on Google's non-Japanese language sites but . . . not yet available on any Japanese Site operated by Google or any of its Japanese Partners." PXR0598 at -728; Tr. 3120:19-21:2 (J. Adkins).

830. Section 5.1(b)(vi) limits the scope of the agreement to crawlable content, providing an exception for search features "built in reliance on access to content which is not Crawlable," including, for example, content Google manually curates from other data sources and feeds. PXR0598 at -728; Tr. 3121:3-13 (J. Adkins).

831. In sum, Plaintiffs' syndication proposals differ significantly from Google's current search syndication practices. Tr. 3478:24-79:17 (Reid).

b. Google's Competitors Similarly Syndicate Their Search Results and Select Search Features Only Under Specific Circumstances.

832. Microsoft, like Google, syndicates for the sole purpose of passing the syndicated search results on to users—not for the purpose of allowing other search engines to store or analyze the results. Schechter (Microsoft) (30(b)(6)) Dep. Tr. 30:9-17.

833. Microsoft similarly syndicates only a subset of its search features, reserving others just for Bing. Tr. 1068:5-20 (Schechter); RDX0381 ("Bing Search APIs") at .001-.002.

834. Prohibitions on storage and analysis of syndicated results and on reverse engineering are industry standard for search syndication agreements. Tr. 1072:6-17 (Schechter).

835. Like Google's agreements, Microsoft's terms of service and standard syndication agreements prohibit customers and partners from storing and analyzing results and from reverse engineering Microsoft's proprietary technologies. RDX0380 ("Bing Search API Legal Information") at .002-.003; RDX0317 ("Bing Syndication Traffic Quality Policy") at .012.

836. For example, the terms of service for Microsoft's Bing Search API provide that users may not use the services to: "[c]opy, store, archive, or create a database of Content" nor to "[r]everse engineer, decompile, or disassemble Services, except and only to the extent that applicable law expressly permits, despite this limitation." RDX0380 at .002-.003.

837. The purpose of these prohibitions on storing Microsoft's proprietary content and reverse engineering its services is to protect Microsoft's intellectual property and systems that could be subject to decompiling attacks. Indeed, Microsoft imposes those prohibitions to prevent derivative usage of its data, or usage of the data for purposes other than for showing search results. Tr. 1071:9-72:1 (Schechter); Schechter (Microsoft) (30(b)(6) Dep.) Tr. 29:7-30:17.

838. Microsoft's syndication traffic quality policy similarly provides that Microsoft's syndication partners may not: "edit, modify, reverse engineer, decompile, or otherwise alter the Bing Services, except where the foregoing is expressly permitted by law." RDX0317 at .012.

839. Microsoft imposes these prohibitions to protect its intellectual property and the overall quality of its services. Schechter (Microsoft) (30(b)(6)) Dep. Tr. 27:16-28:8.

840. Microsoft's syndication traffic quality policy further provides that its syndication partners may not: "copy, store, or cache any Results, except as required to use the Bing Services or as contemplated under the Agreement, or redirect a user click on a Result away from the intended landing page." RDX0317 at .013.

c. Plaintiffs' Syndication Proposals Would Unduly Burden Google.

841. Requiring Google to syndicate in such a way as to reproduce the Google.com experience, and to syndicate features and underlying data it has never syndicated, would place an undue burden on Google. Tr. 3478:24-79:17, Tr. 3500:12-03:10 (Reid).

842. Google's current syndication API returns limited data in response to queries, focusing on ranked web results (i.e., URLs) and including only "a very small subset of the features that appear on Google.com," whereas Plaintiffs' proposals sweep in a much broader set of features, and require Google to provide page layout and display functionality that syndication partners ordinarily must figure out themselves. Tr. 3478:24-79:11, 3482:7-83:1 (Reid); Tr. 2999:9-17 (J. Adkins).

843. Under Plaintiffs' syndication proposals, moreover, every time Google changed the user interface of a feature or wanted to improve a feature, Google would first need to change its external APIs to port those abilities to syndicators. Beyond creating additional burden, this would delay Google's ability to ship innovations to its users. Tr. 3533:5-22 (Reid).

844. To syndicate the Image Mode experience as it exists on Google.com, for example, Google would first need to understand the competitor's interaction model and the design of their site. Tr. 2999:18-3000:12 (J. Adkins).

845. The server back-end and the front-end user experience would need to be tightly coordinated, and Google would have to spend months working with the competitor on design and specifications just to determine whether it would be able to build what would be required to support the competitor's needs. Tr. 3000:7-20 (J. Adkins).

846. From there it could take years to actually build the product, depending on variables like the competitor's desired interactions and features. Tr. 3000:7-24 (J. Adkins). All of this burden, delay, and expense would be multiplied to the extent that Google were required to serve multiple features to multiple competitors with different user interaction models.

2. Plaintiffs' Syndication Proposals Would Divulge Google's Proprietary Assets and Trade Secrets to Rivals.

847. Section VII.A.1 of Plaintiffs' syndication proposal would require Google to provide competitors with data sufficient to understand the layout, display, slotting, and ranking of all SERP items, including within-feature ranking for Local, Maps, Video, Images, and Knowledge Panel. Pls.' RPFJ § VII.A.1; RDX0706 at .003-.004 (requiring Google to disclose "the ranking of content or results within the SERP module or feature itself for [Local, Maps, Video, Images, and Knowledge Panel]").

848. Forcing Google to syndicate data sufficient to understand the layout, display, slotting, and ranking of all items or modules on the SERP directly discloses key Google technologies that determine which units to display in response to a query, and how to order and display them. Tr. 2814:4-21 (Allan).

849. Tangram is a Google technology that addresses a challenging, important problem in search, and its output reflects the work of hundreds, if not thousands, of Google engineers. As Ms. Reid explained, Google uses Tangram to select the units to return on the SERP out of hundreds of options, based on query understanding, quality, and relevance signals. Tr. 3483:6-25, 3486:20-87:5 (Reid).

850. Under Plaintiffs' proposals, competitors could readily replicate Tangram's output. Google would be required to provide competitors with information sufficient to understand which features were shown and where, such that competitors would be handed the key query, good-feature, and bad-feature inputs that can be used to train an LLM to mimic Tangram's output. Through this training process, competitors' models would learn to recognize, given a particular query, what features Google would return and where it would rank them. Tr. 2836:9-37:15 (Allan); RDXD-20.046 ("LLM Training Data to Reverse Engineer Tangram").

851. Plaintiffs' proposal that Google be forced to syndicate "data sufficient to understand . . . the ranking of content or results within the SERP module or feature itself" for Local, Maps, Video, Images, and Knowledge Panel would mean directly disclosing still more Google technologies, tailored to each module or feature. RDX0706 at .003-.004.

852. Specifically, these disclosures would provide competitors with Google's feature ranking for each of the syndicated units, that is, the output of the work of Google's dedicated vertical teams who solve for vertical-specific ranking challenges. Tr. 2814:22-15:22 (Allan); Tr. 3490:1-25 (Reid).

853. Section VII.A.2 of Plaintiffs' syndication proposals would require Google to syndicate its ranked organic search results. Pls.' RPFJ § VII.A.2.

854. In the world of LLMs—armed with Google's ranked organic results and free from any of the industry-standard restrictions on storing and analyzing them—competitors could readily train models to replicate the final output of Google's ranking systems. Tr. 2819:6-20:1 (Allan); Tr. 3515:24-17:8 (Reid) ("[A]ll of that work[] to understand how do you weight the different signals, how do you develop the signals, how do you compose the signals into something that produces the final ranking. That information essentially gets shared because you can -- you can train models, especially in the world of LLMs, pretty effectively to say, given this final output and given these inputs, produce a model that predicts essentially that ranking.").

855. Section VII.A.3 of Plaintiffs' syndication proposal would require Google to syndicate, as an initial matter, "user facing query correction" models. Tr. 2816:9-20 (Allan); Pls.' RPFJ § VII.A.3; RDX0706 at .004.

856. Section VII.A.3 would further require Google to syndicate "query rewriting models that are not user facing"—thereby forcing direct disclosure of Google's proprietary back-end query understanding systems. Pls.' RPFJ § VII.A.3; RDX0706 at .004; Tr. 3497:15-98:12 (Reid).

857. Under this proposal, competitors could simply copy Google's back-end query interpretation innovations and incorporate them into their own search engines. Tr. 2816:9-20, 2817:13-19:5 (Allan).

858. For example, the query interpretation information for a given user query would include Google's understanding of the relative importance of each different word within the query, and Google's proprietary calculations of its confidence that a variety of possible expansions or synonyms were related to those query words. Under Plaintiffs' proposals, competitors could "mine from all that information" and create "a thesaurus of query words" that

replicated Google's proprietary query understanding technologies. Tr. 2784:25-86:14, 2817:13-19:5 (Allan); RDXD-20.008-.009, .032.

859. These query understanding technologies have been painstakingly developed by hundreds of Google engineers to better address user needs. Tr. 3498:13-17 (Reid); RDX0062 at .003-.004; RDX0060 at .004-.005.

860. Section VII.A.4 of Plaintiffs' syndication proposals would require Google to syndicate features it does not syndicate and furnish rivals with data assets and technologies unrelated to scale. Tr. 3498:18-99:1, 3503:11-23, 3448:24-49:9, 3503:24-04:22 (Reid); RDX0708 at .004.

861. Plaintiffs' syndication proposals would also require Google to syndicate features in a manner it has never syndicated *any* feature, that is, by syndicating complete feature experiences, including within-feature interactive content. Tr. 3499:2-3500:2, 3501:22-02:10 (Reid); RDXD-28.026.

862. Under Section VII.A.4, Google would first be required to syndicate information sufficient for a competitor to understand Local, Maps, Video, Images, and Knowledge Panel "as [they] appear[] to the user on the [SERP]." Thus, Google would be required to syndicate enough information for the competitor to be able to "actually redisplay" these features, an amount of information that would be "quite extensive," given the constant evolution of the display and rendering of these features. Pls.' RPFJ § VII.A.4; Tr. 3499:2-3500:2 (Reid); RDX0708 at .004.

863. Google would be further required under Section VII.A.4 to syndicate information sufficient "to produce what is shown to the user once a user has clicked on" Local, Maps, Video, Images, or Knowledge Panel features. That additional requirement sweeps in still more

technologies that Google has deployed to enhance users' interactive experience with modules or features on the SERP. Pls.' RPFJ § VII.A.4; RDX0708 at .004; Tr. 3500:12-01:14 (Reid).

864. This additional provision would amount to requiring Google to syndicate the full "Google.com" experience, including the many expansion and filtering interactive features. Tr. 3500:12-01:14 (Reid); *see supra* ¶¶ 811-14, 844-46; RDX0708 at .004.

865. Google does not syndicate certain of the features enumerated in Plaintiffs' proposals, nor in the manner Plaintiffs' proposals would require, both to protect its intellectual property and for reasons of technical impracticality. Tr. 3502:8-03:10 (Reid); *see supra* §§ V.E.1.a, c.

866. As an example of the Google technologies and innovation involved in developing these features, the unique ranking and interface challenges associated with each different feature and vertical require separate teams and "at least a few hundred" people dedicated to addressing them, and determining where and how to display content within associated modules on the SERP. Tr. 3452:8-53:5, 3491:24-92:12 (Reid).

867. Section VII.A.5 of Plaintiffs' syndication proposals would require Google to syndicate its FastSearch results. Pls.' RPFJ § VII.A.5.

868. FastSearch is a component of Google's search stack that relies on RankEmbed to produce a faster pass at retrieval. Tr. 2816:2-17:12 (Allan); Tr. 3509:23-11:4 (Reid).

869. FastSearch is used in grounding by LLMs and as part of certain other features. Tr. 3509:23-10:11 (Reid).

870. Google offers search grounding to certain third parties. The primary way Google does so is through the Google Cloud team's Vertex API product. The Vertex API does not provide direct access to Google's FastSearch results for grounding; instead, Google's internal

LLM provides a grounded response to a Vertex API client. Tr. 3512:1-13:4 (Reid); *see also* Tr. 3339:5-40:18 (Collins (Google)).

871. Google does not provide direct access to its FastSearch results for grounding to its Vertex clients in order to protect the intellectual property and innovation associated with returning FastSearch results. Tr. 3512:1-13:12 (Reid); Tr. 3340:19-41:7 (Collins) ("[I]f we provided direct access [to Google's search results] then -- through an API then developers could reverse engineer Search or any other grounding service we expose them to, potentially train on, train AI models on the output and so on."). Google also has a pilot agreement with Meta pursuant to which it provides certain grounding, again with protections to avoid IP leakage. PXR0101 at -743.

872. Because "[t]he core of Fast Search is [RankEmbed]," forcing Google to syndicate FastSearch results reveals Google technologies that power RankEmbed and enable fast retrieval. Tr. 2816:21-17:12 (Allan) ("Fast Search is [RankEmbed] plus a few minor additions on top of it[.]").

873. With the forced syndication of FastSearch results to any "Qualified Competitor," Google's competitors could mimic the output of, or otherwise reverse engineer, the underlying technology that Google uses to train a model to determine which documents to return most efficiently and effectively. Tr. 3510:22-11:4 (Reid); Tr. 2816:21-17:12 (Allan); *see supra* § V.C.1.b.

874. Individually and collectively, these syndication proposals would directly disclose a wide swath of Google technologies, and would enable competitors to reverse engineer further Google technologies. Tr. 2780:1-81:15, 2815:23-16:8 (Allan); Tr. 3479:18-80:17 (Reid).

875. The scope and ongoing nature of Plaintiffs' syndication proposals over a ten-year period significantly compounds the loss of intellectual property and proprietary data. Google would be required to continue syndicating, for example, its back-end query understanding information, as well as every new innovation associated with a wide variety of features as displayed on Google.com. As Professor Allan explained, "this continues over and over each time -- and every time Google creates some innovation, every time Google does something new," and "every new technology that Google builds that's connected with Search is likely to be reverse engineerable out of this data." Tr. 2844:5-45:24 (Allan); RDXD-20.050-.051.

3. Allowing Rivals to Submit Synthetic Queries Compounds the Harms of Forced Syndication.

876. Plaintiffs' syndication proposals would also require Google to return search results, at marginal cost, in response to competitors' synthetic or simulated queries, in the same format as results returned for actual user queries, and with the maximum number of allowable synthetic queries to be determined by Plaintiffs and the Technical Committee. Pls.' RPFJ § VII.E.

877. Competitors would "be entitled to log and use (in any way) Google's results, including ads and anything else that would appear on a Google SERP." Pls.' RPFJ § VII.E.

878. Plaintiffs' synthetic query provision would force Google to disclose still more of its intellectual property and enable more targeted forms of reverse engineering. Tr. 3514:20-15:23 (Reid); Tr. 2813:17-14:3 (Allan).

879. The synthetic query provision, as part of Plaintiffs' broader syndication proposals, would enable a competitor to more efficiently mimic or otherwise reverse engineer Google's technologies for particular types or categories of search queries. Tr. 2837:17-38:7 (Allan); Tr. 3514:20-15:4 (Reid).

880. Moreover, competitors could utilize Plaintiffs' synthetic queries provision to, in "a very methodical" way, scrape information and recreate content databases that Google has developed through significant effort, investment, and innovation. Tr. 3514:20-17:8 (Reid).

F. The Compulsory Syndication of Google's Search Text Ads Would Deprive Google of Its Intellectual Property and Degrade Quality for Users and Advertisers.

881. AdSense for Search (AFS) is Google's ads syndication product, which allows an ads syndicator, sometimes referred to as a publisher, to request Google ads for display on the syndicator's website. Tr. 2957:18-22, 2957:25-58:17. (J. Adkins).

882. When an ads syndicator receives a user query, they send Google an ad request. Google then runs an auction to select the ads for that request, and serves the ad results into an iframe on the ads syndicator's website. Tr. 2959:25-60:14 (J. Adkins).

883. If the ad receives a click from a user, the advertiser will pay Google for that click, and Google will pay the ads syndicator a revenue share. Tr. 2958:24-59:6. (J. Adkins).

884. Google's advertisers can opt into whether they want to show ads on ads syndicators' sites generally, which collectively are known as the "search partner network." Google also permits advertisers to exclude their ads from showing on specific ads syndicators' sites. Tr. 2959:8-15. (J. Adkins).

885. Generally, Google's ads syndication partners are free to use other providers of syndicated search ads because the agreements are not exclusive. Tr. 2993:7-12 (J. Adkins).

886. As explained below, the compulsory syndication of Google's ads under the terms of Plaintiffs' RPFJ would eliminate many of Google's policies that protect advertisers and users and would allow rivals to use Google's intellectual property.

1. Plaintiffs' Proposals Would Create Misaligned Incentives That Harm Both Advertisers and Users.

887. Section VIII.E of Plaintiffs' RPFJ would prohibit Google from imposing any conditions on the use or display of the ads provided to ads syndicators, which would undermine numerous restrictions Google has implemented to protect advertisers and enhance the user experience.

888. Google currently places certain conditions on the manner in which websites may display the ads they syndicate from Google. Tr. 2972:4-8 (J. Adkins).

889. These restrictions ensure that syndication partners do not manipulate advertisements to maximize revenue by tricking or confusing users into clicking on ads (practices known as "trick-to-click"). Tr. 2972:9-21 (J. Adkins).

890. Although advertisers must pay syndication partners for these clicks, the clicks offer little value to the advertiser since the user was misled into clicking, rather than having a true interest in the ad. Tr. 2977:9-20 (J. Adkins); *see also* Tr. 3209:13-11:12 (Israel) ("So publishers want to maximize click revenue, and advertisers want to, you know, get a return on their ad, and so an individual publisher, an individual site might have an incentive to do tricky things to get clicks. . . . So today Google sits in the middle and so has an incentive to balance the interests of both sides. Individual publishers don't have that same interest.").

891. Google's current policies also ensure that ads, which are priced based on the ad's position on the search results page, are displayed by the ads syndicator in the correct order. Tr. 2972:9-21 (J. Adkins).

892. Google implemented its display restrictions in response to specific instances of ad manipulation. Tr. 2973:10-17 (J. Adkins) (explaining that Google launched changes to its ad styling system because syndication partners were utilizing "techniques to increase the partners'

revenue at the expense of the user and at the expense of the advertiser"); Tr. 2976:13-77:8 (J. Adkins) (explaining that Google is responsible for the relationship with the advertiser and must "make sure that they're getting the value that they're paying for").

893. In some instances, for example, syndication partners would decrease the readability of ad copy, enlarge click targets on ads, or minimize the legally required "sponsored" ad label, such that users were more likely to click. Tr. 2974:25-75:19 (J. Adkins).

894. Such manipulation can be lucrative for syndication partners since they are paid for clicks, regardless of the user's behavior after the click. In one example, a manipulated ad generated 20% more revenue than the same ad that was not similarly tampered with. Tr. 2977:9-20, 2978:9-13 (J. Adkins); RDX0066 at .008.

895. Google's ad display restrictions, which the RPFJ seeks to eliminate entirely, benefit the user by requiring better ads that are easy to read, provide sufficient information (include pricing information where applicable), and are clearly labeled as sponsored advertisements. Tr. 2976:13-77:8, 2978:14-79:4, 2982:23-83:7 (J. Adkins).

896. Google also imposes restrictions on the use of its syndicated ads. Tr. 2979:5-80:25 (J. Adkins); RDX0420 at .006 (§ 2.2(m)); *see infra* § V.F.4.

897. For instance, Google limits the extent to which an ads syndicator can alter the user's query when submitting an ad request to Google. Tr. 2980:8-81:12 (J. Adkins).

898. If Google was not permitted to impose this restriction, the syndication partner could append any information to the query to return an ad with a higher cost-per-click, thereby increasing the payment it receives as part of its revenue share. Tr. 2980:20-25 (J. Adkins).

899. Google also prohibits certain search arbitrage practices—for instance, Mr. Adkins provided an example where an ads syndicator, exploreanswers.com, purchased an ad slot on a

Forbes article about mortgage interest rates. A user who clicks on the Forbes ad will be brought to a page of "related search topics" on exploreanswers.com. A user who then clicks on one of the related searches is brought to a Yahoo page that shows only ad results provided by Bing, and does not show any organic search content. Tr. 2981:14-83:17 (J. Adkins); DXD-19.003-.005.

900. Mr. Adkins explained that in this example, Yahoo paid for traffic from exploreanswers.com by purchasing an ad slot on the site, and a click on that ad leads users to Yahoo's own page of ads where it could earn a profit by charging advertisers a higher cost-per-click than Yahoo's traffic acquisition costs. Tr. 2981:14-83:17 (J. Adkins).

901. Mr. Adkins testified that although Bing or Yahoo apparently permits such ads syndication practices, Google prohibits its ads syndication partners from exclusively showing ads with no organic results on the page. Tr. 2982:15-22, 2984:13-24 (J. Adkins).

902. Google also prohibits its partners from buying unqualified traffic from content pages because Google's advertisers would "lose trust in Google when they . . . were taken advantage of because of these kind of techniques like arbitrage." Tr. 2984:13-24 (J. Adkins).

903. Mr. Adkins further explained that ads syndication partners try variations of different misleading practices, which advertisers often report to Google for investigation when advertisers end up paying for poor quality leads. Tr. 2985:5-87:14 (J. Adkins) (describing various techniques ad syndicators have used to mislead users into engaging with advertisers); RDX0032 at .003; RDXD-19.006.

904. Google imposes policies to prevent the misuse of their syndicated ads because it tries to protect its advertisers from arbitrage schemes that inflate syndication partners' revenues while misusing advertisers' budgets and delivering poor value clicks. Tr. 2984:13-24, 2978:14-79:4 (J. Adkins).

905. Along these same lines, the RPFJ allows Qualified Competitors to prescribe a minimum CPC (cost per click) for syndicated ads. This would allow Qualified Competitors to inflate ad revenue by evaluating which ad network is offering a higher bid for an ad in response to a query. Tr. 2992:22-93:6 (J. Adkins).

2. Plaintiffs' Proposals Would Compel Google to Disclose Highly Confidential Advertiser Data and Private User Information.

906. Plaintiffs' RPFJ's requirement that Google provide "all Ads Data" related to the syndicated ads, including conversion data and "without restrictions on use of the Ads Data," violates Google's obligations to safeguard advertiser and user data. Pls.' RPFJ § VIII.E.

907. The compelled disclosures under Plaintiffs' proposal would include advertisers' proprietary business information, which is sensitive financial data that Qualified Competitors could use for competitive intelligence. Tr. 2970:17-71:8 (J. Adkins).

908. Requiring disclosure of this information could dissuade advertisers from participating in Google's search ads network entirely, meaning that Google's advertisers would opt out of allowing its ads to show on syndication partners' sites. Tr. 2970:17-71:8 (J. Adkins).

909. As to users, Plaintiffs' proposal requires disclosure of conversion data, which Google does not currently provide. *First*, conversion data is challenging to provide as a practical matter because a conversion does not occur upon a user clicking an advertisement, and may take several days. Tr. 2971:9-16 (J. Adkins).

910. *In addition*, with respect to the user privacy concerns, conversion data conveys sensitive information about what a user did on the advertiser's website, which adds additional privacy risks. Tr. 2971:9-23 (J. Adkins); Tr. 3692:19-94:1 (Culnane); *see supra* § V.D.1.

3. Google Currently Syndicates Its Ads Under Specific Conditions for Sound Business Reasons.

911. Various contractual provisions mandated by Plaintiffs' RPFJ are unheard of in the ads syndication business. Compelling Google to comply with these provisions would undermine Google's reasonable business practices, harm Google and the ads syndication market, and offer no competitive benefit. Tr. 3204:10-07:9 (Israel).

912. Plaintiffs' RPFJ Section VIII.E would require Google to provide Qualified Competitors with search ads syndication licenses for ten-year terms. Google's current ads syndication licenses have a standard term length of two years for directly negotiated partnerships. The RPFJ's extended term length would eliminate the flexibility afforded by Google's current agreements, which allow both Google and its syndication partners to regularly assess the agreements' strengths and weaknesses and adjust accordingly. Tr. 2964:7-14 (J. Adkins); Pls.' RPFJ § VIII.E.

913. In that same vein, Plaintiffs' RPFJ Section VIII.E would require Google to offer ads syndication "on financial terms no worse" than those offered to any other partner. However, Google directly negotiates financial terms with a number of different partners who provide varying degrees of value, and which correspond to very different sets of non-financial terms. Plaintiffs' RPFJ requirements would force Google to treat all syndication partners the same, regardless of the value they provide. Pls.' RPFJ § VIII.E; Tr. 2965:23-66:7 (J. Adkins); Tr. 3209:13-11:12 (Israel); RDXD-27.011.

914. The contingent ad syndication proposal only exacerbates these issues—after five years, Plaintiffs would price compelled syndication at marginal cost if they "demonstrate by a preponderance of evidence that either or both monopolized markets have not experienced a substantial increase in competition." Pls.' RPFJ § VII.D; Tr. 3256:10-57:16 (Israel). Dr. Israel

explained that such "price regulation . . . has been found to be harmful in most every economic context," and that a contingent remedy in another case "led to multiple additional trials and tens of millions of dollars in costs. . . . [W]hen you have a contingent remedy based on some future economic finding, based on a preponderance of the evidence, it just becomes unwieldy and extremely expensive." Tr. 3256:10-58:11 (Israel).

915. Plaintiffs' RPFJ Section VIII.E further provides that Qualified Competitors will, in their sole discretion, determine how much information to share with Google regarding the end-user. Currently, Google collects the information that is required for running ads and avoids collecting extraneous information. To the extent rivals ask to withhold additional data, it would obstruct Google from operating the ads syndication service. Tr. 2966:8-67:2 (J. Adkins); Pls.' RPFJ § VIII.E; *see also* Tr. 2962:2-22 (J. Adkins) (explaining that Google must collect data from the ads syndicator to detect invalid traffic from botnets so that Google's advertisers are not charged for those clicks).

916. The proposed remedy would also prohibit Google from "retain[ing] or us[ing] in any way syndicated queries or other information it obtains . . . for its own products and services." However, Google's syndication service is built on the same infrastructure as ads on Google.com, and Google uses data from the syndication service to improve and maintain that shared infrastructure—such as for planning data center capacity to minimize latency. Pls.' RPFJ § VIII.E; Tr. 2993:16-94:15 (J. Adkins).

917. Furthermore, Plaintiffs' RPFJ Section VIII.E would require that Google's ads syndication licenses include all types of search text ads, including any assets, extension or similar search text ad variations appearing on Google's SERP. While Google generally provides equivalent latency and reliability to partners, many launches require coordination across multiple

Google teams, and mandating the immediate rollout of new features to the syndication business would impose significant burdens. Tr. 2964:15-65:8, 2967:23-68:23 (J. Adkins).

918. Requiring immediate rollout of all Google features to Qualified Competitors would require Google to build two (or more) versions of all features and engage in substantially more coordination, which would slow the pace of innovation. Tr. 2967:23-68:23 (J. Adkins).

919. And while Google strives to provide equivalent performance to syndication partners, Plaintiffs' RPFJ Section VIII.E does not define "performance," and Google cannot guarantee a partner's financial performance due to the multitude of variables that affect monetization, such as the partner's site and where the ads are placed. Tr. 2965:9-22 (J. Adkins).

4. Plaintiffs' Proposals Would Divulge Google's Intellectual Property to Rivals.

920. Numerous ads syndication provisions in Plaintiffs' RPFJ risk revealing Google's intellectual property, including: (i) the requirement that Google must provide "all Ads Data related to the [syndicated] ads provided to the Qualified Competitor" (§ VIII.E); (ii) the requirement that Google may not prevent Qualified Competitors from "scraping, indexing, or crawling the syndicated results," (§ VIII.E); and (iii) the requirement that "Google must permit, at marginal cost, Qualified Competitors to submit synthetic or simulated queries, and Google must provide results" (§ VII.E).

921. *First*, under the terms of Plaintiffs' RPFJ, Google would be compelled to provide significantly more data about the ads provided to syndication partners, which would expose Google's intellectual property.

922. Currently, Google's ads syndication partners receive data only on the number of ads Google displayed on the site for a given query, but syndicators do not receive information on which advertisements showed. Tr. 2968:24-69:15 (J. Adkins).

923. The ads syndicator also receives aggregated reporting on the number of impressions, number of clicks, click-through rate, total revenue, and average cost per click for its entire website. However, the ads syndicator never receives information on the individual ad level or on the specific advertisers that showed ads on their sites. Tr. 2969:16-70:4 (J. Adkins).

924. Additionally, because Google serves the syndicated ad result in an iframe, the syndication partner does not receive any ads data when Google transmits the ad to the user. The user's web browser sends a search request directly to Google's server, and when Google delivers the ad into the iframe, any information on the ad has bypassed the syndicator's server entirely. Tr. 2959:25-60:14 (J. Adkins).

925. Because Plaintiffs' RPFJ Section VIII.E would require Google to provide "all Ads Data related to the ads provided" via syndication, it encompasses all of the user and advertiser data implicated in RPFJ Section VI.E, including which ads showed on specific queries, as well as Google's internal proprietary signals. Tr. 4449:21-50:8 (Muralidharan).

926. *Second*, Plaintiffs' RPFJ also prohibits Google from placing conditions on Qualified Competitors with respect to scraping, indexing, or crawling syndicated content. Pls.' RPFJ § VIII.E.

927. Google imposes these conditions and restrictions to protect Google's trade secrets and intellectual property from reverse engineering, and to prevent syndication partners from accessing advertisers' proprietary business information. Tr. 2988:23-89:3 (J. Adkins).

928. The ads syndication agreements that Google uses today explicitly prohibit ads syndicators from copying, scraping, or attempting to reverse engineer Google's ad results. *See, e.g.*, RDX0047 at .004 (Google's agreement for its self-service AFS offering, specifying that the ads syndicator "may not copy, modify, distribute, sell, or lease any part" of Google's AFS

services and may not "reverse engineer or attempt to extract the source code of that software"); RDX0420 at .007 (Google's negotiated AFS agreement with [redacted], similarly prohibiting the ads syndicator from "knowingly or negligently" allowing any third party to "'crawl,' 'spider,' index, or in any non-transitory manner store or cache information obtained" from Google's syndicated ads results); RDX0404* at .006 (same provision in [redacted] agreement).

929. Google's contractual prohibitions against scraping or storing of its ads results are industry standard. Other ads syndication providers like Microsoft have very similar terms because it is widely recognized that such policies are required to protect intellectual property and prevent reverse engineering. *See supra* § V.E.1.b.

930. *Third*, Section VII.E of Plaintiffs' RPFJ would require Google to send ad results in response to any synthetic queries submitted by a Qualified Competitor. Therefore, third parties would not be limited to the Google ad results submitted by real users from the syndicator's site because rivals will also be permitted to send simulated queries. *See* Pls.' RPFJ § VII.E. And advertisers would also be harmed, particularly if the Qualified Competitor chooses to click on (thereby triggering payment) or harvest information from the ads returned in response to the synthetic queries.

931. Dr. Muralidharan explained that if third parties received enough data on which ads Google showed in response to specific queries, third parties would be able to train machine learning models on Google's intellectual property. Tr. 4423:19-24:20 (Muralidharan).

932. He elaborated that Section VII.E takes this one step further by allowing third parties to train on Google's queries and ad results, then refine their models by testing specific synthetic queries where the results are poorer, until the model performs as close to Google's model as possible. Tr. 4450:24-51:13 (Muralidharan).

VI. THE IMPOSITION OF CHOICE SCREENS WOULD IMPAIR INNOVATION AND CONSUMER WELFARE.

933. Plaintiffs' RPFJ would require Google to offer to Distributors of non-Apple, third-party Devices either a "Search Access Point Choice Screen" or a "Search Default Choice Screen" on every Google Search Access Point that was preinstalled prior to the date of the Final Judgment. For each device, Google would be required to offer to pay "a fixed monthly payment equal to the average monthly amount that Google paid to the Distributor for that Device" for the lifetime of the device, up to one full year. Pls.' RPFJ §§ IX.A, D.1-2.

934. If all Android partners accepted this offer, it could amount to over $1.5 billion paid by Google. Liability Tr. 5727:5-28:11 (Whinston (Plaintiff Expert)); UPXD0104 at 19.

935. Plaintiffs apparently recognize that the Court cannot *require* third parties to have a choice screen, and that those third parties would never do so voluntarily. *Compare* Pls.' RPFJ § IX.A (requiring Google to "offer the Distributor the option to display"), *with* Pls.' RPFJ §§ IX.B-C (requiring choice screens for Google Devices and Browsers); Tr. 2187:18-88:1 (Chipty).

936. But under Plaintiffs' RPFJ, a Distributor's only other option would be to discontinue receiving any payments from Google at all. Plaintiffs' RPFJ would ban Google from making any other payments for search promotion, including choice screens on new devices and choice screens on installed-base devices after one year. *Supra* § II.

937. Plaintiffs' RPFJ also would require Google to implement choice screens on all Google Browsers, including user-downloaded Chrome, and all Google Devices, including Pixel devices, and IoT devices such as smart speakers and wearables, for the duration of the Final Judgment. For new Google Devices, Google would be required to implement a Search Access Point Choice Screen or preinstall a Google Search Access Point with a Default Search Choice

Screen. For existing Google Devices, Google would be required to implement a choice screen for each Search Access Point or otherwise delete the Search Access Point. Pls.' RPFJ §§ IX.B-C.

938. Under Plaintiffs' RPFJ, if Google implements a Search Access Point Choice Screen that offers a Google Browser, and the user selects the Google Browser, Google would then be required to display a Default Search Engine Choice Screen as well. Pls.' RPFJ §§ IX.A-B. In other words, Google must offer a choice screen within a choice screen.

939. Moreover, because Plaintiffs define "Search Access Point" to encompass the Gemini App, Google would need to offer a choice screen of Gemini App alternatives or face the removal of the Gemini App from Google devices. Pls.' RPFJ § III.V.

940. Plaintiffs—in consultation with the Technical Committee—must approve any choice screen, and "may require modifications to any Choice Screen over time." Pls.' RPFJ § IX.D.

941. Plaintiffs' RPFJ would require users to make a choice screen selection on first use and then again on an annual basis. *See* Pls.' RPFJ §§ IX.D.1.c, 2.c.

A. Search Engine Choice Screens Have Not Been Adopted Outside of Regulation.

942. Search choice screens have not been adopted absent regulatory intervention. Tr. 4270:1-72:1, 4358:23-59:3 (Murphy (Google Expert)); Tr. 565:6-12 (Rangel (Plaintiff Expert)).

943. Google's general search rivals, such as Microsoft, Yahoo, and DuckDuckGo, do not contract for a choice screen. *E.g.*, Liability Tr. 9797:16-9800:25 (Murphy); DXD-37.075.

944. Web browsers universally prefer default search engines to choice screens. Tr. 3130:2-18 (Muhlheim) (explaining that Mozilla has a default search engine "to enable . . .

search behavior in the most efficient and effective way possible" and "make sure that Firefox is as useful directly out of the box for everybody when they get it"); Tr. 565:13-16 (Rangel).

945. For instance, not only is DuckDuckGo the default search engine on the DuckDuckGo browser, but DuckDuckGo *prevents* users from switching to alternative providers, including Google. Tr. 886:5-87:22 (Weinberg (DuckDuckGo)).

946. Microsoft also makes it difficult for users to select Google as the default GSE. *See* Liability Tr. 2352:1-6 (Giannandrea (Apple)); Liability Tr. 711:14-12:5 (Rangel) ("I have also investigated the choice friction in Edge and in Windows computers. I cannot, again, provide a ranking, but I can testify that the choice friction in Bing is substantial.").

B. Choice Screens Would Have Minimal Effect on Search Usage.

947. It is undisputed that choice screens are unlikely to have any material effect on market share. Liability Tr. 6091:3-21 (Whinston) (agreeing that choice screens would shift "less than 1 percent of U.S. market share"); Tr. 4223:16-25:2 (Murphy) (same) (testifying about RDXD-33.011); Tr. 556:16-58:4 (Rangel) ("[T]here is going to be a sizable, quite sizable number of consumers based on the data that we have seen, that choose Google after the choice screen and were using Google before."); Tr. 2187:4-17 (Chipty (Plaintiff Expert)) ("We know from Europe that when users are given a choice today, they will overwhelmingly choose Google").

948. This is because "most people would still pick the best product," i.e., Google. Tr. 3829:3-3830:10 (Cue); *see also* Kim (Samsung) Dep. Tr. 239:7-40:1 ("[T]he Google position became, I think, better or same. . . . I don't think that [choice screens] changed the . . . search market share within Europe."); LaFlamme (Motorola) Dep. Tr. 86:4-89:2 ("So by virtue of going to choice screen[s], we believe it has not changed behavior in the consumer, they are still choosing Chrome, even once given the choice[.]").

949. Tellingly, competitors to Google Search have not identified a choice screen design that would materially change general search market share. *E.g.*, Tr. 1003:1-3 (Weinberg) ("Q. Have you found a choice screen that any regulator has adopted that you think is an acceptable choice screen? A. No."); *see also* Tr. 866:13-25 (Weinberg) ("[T]he optimal choice screen design is unknown because it's never been tested.").

950. The search engine choice screen in Europe has resulted in a negligible shift in market share. Similarly, the recent Allcott study found that only 1.1% of U.S. Google users switch to a non-Google default when presented with the option (compared to 16% of Bing users that switch to Google). *See supra* ¶¶ 32-38.

951. Choice screens are likely to be even less effective on Google's products and search access points given that users tend to be loyal to Google and expect a Google-forward experience. Boulben (Verizon) Dep. Tr. 114:22-15:14 (agreeing that "customers who are purchasing Pixel devices expect a Google experience on those devices . . . all the communication around the Pixel is about, this is how you get the best out of the Google experience").

952. Choice screens for search access points on Google devices specifically would not shift share to rivals because search on Pixel devices accounts for only 2.5% of Google queries. Tr. 4271:17-72:1 (Murphy). A 1% share shift on a tiny percentage of queries is even tinier. Accordingly, imposition of a choice screen on these devices would result—even in Plaintiffs' best-case scenario—in an infinitesimally small share shift. Tr. 2301:22-02:7 (Chipty).

C. Choice Screens Would Harm the User Experience, Innovation, and the Competitiveness of Android.

953. While choice screens would have no effect on shares, they would negatively impact the user experience, impede Android competing with Apple, and undermine innovation.

954. Plaintiffs' expert, Professor Rangel, did not assess whether consumers would prefer a choice screen rather than a default, nor did he specifically study whether search engine choice screens impose costs on users. Tr. 584:15-85:12 (Rangel).

955. Forcing "Search Access Point" and "Search Default" choice screens into the start-up process degrades the out-of-box experience where users want a streamlined process with intuitive, easy-to-understand steps. Boulben (Verizon) Dep. Tr. 116:4-20 (explaining that the "optimal" out-of-box experience consists of "a small number of steps and intuitive, easy to understand . . . steps"); Baker (Mozilla) Liability Dep. Tr. 300:2-21 ("[P]eople say they want choice, but they don't want to . . . make decisions . . . . The . . . longer it takes people to get to what they want to do, the more dropoff there is, and our experience is that, you know, people like opening up the browser and being able to do what they want to do."); Liability Tr. 2471:22-72:21 (Cue); Liability Tr. 9797:16-9800:25 (Murphy).

956. And choice screens deprive users of receiving a "recommendation" from the manufacturer or carrier regarding the best product to use. Tr. 4273:6-74:21 (Murphy).

957. Implementing choice screens would be especially frustrating for existing devices. Tr. 4270:1-71:16, 4330:3-31:3 (Murphy) (explaining that "a choice screen that shows up later is somewhat more disruptive than a choice screen that shows up at the beginning, because it's not part of your normal set-up process").

958. And under Plaintiffs' RPFJ, navigating choice screens is not just a one-time inconvenience, but instead would require users to confirm their selection every year. Tr. 4270:1-71:16 (Murphy) ("[T]hese choice screens have much more costs than even the ones we've seen in the past, because these are choice screens that would show up every year.").

959. Choice screens would also degrade user experience on Android devices, where "customer[s] expect to have the Google experience." Boulben (Verizon) Dep. Tr. 39:11-19.

960. This is particularly true for Google devices, such as Pixel, where users expect the most Google-forward experience possible. Boulben (Verizon) Dep. Tr. 117:6-15 (explaining that choice screens would "detract" from the Pixel out-of-box experience "because customers buying the Pixel expect to have the best of the Google experience"); Tr. 4317:12-18:4 (Murphy) ("[Y]ou would be eliminating a relatively unique feature of those devices.").

961. Choice screens further disadvantage Android devices vis-à-vis Apple, making the smartphone market even less competitive. *See* Kim (Samsung) Dep. Tr. 239:7-40:1 (explaining that choice screens in Europe "made [the] Apple position stronger"); Boulben (Verizon) Dep. Tr. 116:21-17:5 ("Q. Is that one of the competitive advantages that Apple has, is its out-of-the-box experience? A. I think it's a key part of the Apple experience, yes.").

962. In addition, as Professor Murphy testified, holding the design of Google products hostage to a Technical Committee impedes innovation. Tr. 4318:5-22 (Murphy).

963. Under the RPFJ, all choice screens would be subject to approval of the Technical Committee. But requiring a Technical Committee for choice screen approval and modification is incompatible with the dynamic pace of innovation in the smartphone market. If Technical Committee approval is required, Google would be delayed in launching new Google devices, and any new, innovative search access points. Pls.' RPFJ § IX.D; Tr. 4318:5-22 (Murphy).

964. In addition, Plaintiffs' broad definition of "Search Access Point," combined with the choice screen proposal, creates ambiguity that could stifle innovation. The RPFJ would require choice screens for future, not-yet-developed technologies without regard for feasibility or standards for implementation. *See, e.g.*, Tr. 2171:18-72:5 (Chipty) ("Gemini, or a future version

of it, might be a search access point."); *see also* Pls.' RPFJ § III.V (defining Search Accept Point to mean "any software . . . where a user can enter a query or prompt" and "receive . . . a response that *includes* information from a GSE, including . . . GenAI Products" (emphasis added)).

965. For instance, if Google innovates an entirely new "Search Access Point" in the next decade, Plaintiffs' RPFJ may preclude Google from loading that product on Google devices until there exist "three-to-four" rival products "of the same type" on the market. *See* Pls.' RPFJ § IX.D.1.a. Relatedly, Plaintiffs' RPFJ is unclear about whether Google would be required to wait for search rivals to build interoperable services that work with a potential new Search Access Point prior to its launch. Pls.' RPFJ § IX.D.2.a.

VII. PLAINTIFFS' PROPOSED REMEDIES REGARDING GENERATIVE ARTIFICIAL INTELLIGENCE WOULD STIFLE INNOVATION AND PREEMPT COMPETITION.

966. At liability, Plaintiffs argued that "[g]enerative AI systems, like ChatGPT, are not a reasonable substitute for GSEs" because, among other things, "[u]sers have not replaced their use of traditional search with chatbot-based search tools, like Google's Bard or Microsoft's Bing Chat." Plaintiffs' Proposed Findings of Fact ("Pls.' Liability PFOF") (ECF No. 822) ¶¶ 391, 395. There was no contention (much less a finding by the Court) that Google had engaged in any anti-competitive conduct with respect to such products.

967. Nonetheless, Plaintiffs' RPFJ Section IV contains provisions that would substantially limit Google's distribution of any GenAI Product (broadly defined as any product that "makes use of Generative AI capabilities or models," Pls.' RPFJ § III.K) that meets its definition of a "Search Access Point" (broadly defined as any such product that "can retrieve and display information from a GSE, including links to websites," Pls.' RPFJ § III.V). Plaintiffs' proposed ban on paid distribution of "Search Access Points" would have, for example,

prohibited Google from competing against OpenAI for the paid distribution of their respective GenAI Products within Apple Intelligence. *See infra* § VII.F.

968. Plaintiffs' RPFJ further seeks to enjoin Google from using any Google product to "self-preferenc[e]" its GenAI Products by, inter alia, making any GenAI Product or On-Device AI "explicitly or implicitly mandatory on Android Devices," a vague concept that, the provision says, is exemplified by "preventing interoperability" between (i) "Android AICore or a Google Grounding API" and (ii) "Competitor products and services in the GSE or Search Text Ads markets." Pls.' RPFJ § V.B.1.

969. Finally, the RPFJ contains three sections that would compel Google to ground rival GenAI products. Section V.B.1 would prohibit Google from "preventing interoperability between" a "Google Grounding API" and "Competitor products and services in the GSE or Search Text Ads markets." Section VII.A.5 would mandate Google syndicate its "FastSearch results," which are used for grounding. Tr. 3509:24-3510:11 (Reid (Google)). Section VI.A would expropriate Google's Search Index, which is a component of grounding. *See supra* § V.B.

A. Google Has Been the Leader in AI Innovation for a Decade.

970. Artificial intelligence (or "AI") is "the science and engineering of getting machines, typically computer programs, to exhibit intelligent behavior." Liability Op. FOF ¶ 107.

971. "Generative artificial intelligence" (or "GenAI") refers to those AI models and applications that are designed to generate output such as text, images, or other types of media. *See* Tr. 3315:23-16:2 (Collins (Google)).

972. Google has been responsible for most of the innovations in the past decade that underpin the modern AI field. Tr. 3318:12-16 (Collins) ("Q. And I notice on the slide it says, '[c]ollectively responsible for most of the innovations of the past decade that underpin the

modern AI field.' Is that hyperbole? A. No, that's accurate.") (testifying about RDX0023A at .003).

973. In 2017, researchers affiliated with Google Research wrote and released a paper called "Attention Is All You Need" describing a new deep learning architecture known as the "transformer." Tr. 3318:17-19:7 (Collins); RDX0023A at .003; Liability Tr. 6348:16-50:17 (Nayak (Google)).

974. Google's transformer architecture is the backbone of modern large language models. Tr. 155:4-22 (Durrett (Plaintiff Expert)) ("So the most typical method of implementing large language models these days is a model called the transformer."); Tr. 2447:5-48:13 (Pichai (Google)) ("And about a decade ago, Google invented transformers and they've started -- they are now the backbone of what are called large language models.").

975. In late 2023, Google released the first of its Gemini family of large language models. Today, the Gemini family of large language models are Google's primary consumer-facing family of GenAI models. Tr. 3319:23-20:10 (Collins); RDX0023A at .006-.014.

B. Generative Artificial Intelligence Is a General Purpose Technology with Many Uses Entirely Unrelated to Search.

976. Plaintiffs contended to the Court in their opening statement that "GenAI is a method to access search, period." Tr. 20:5-6 (DOJ Opening). Plaintiffs could not be more wrong. GenAI is a "general-purpose technology," used in a wide range of industries, including healthcare, education, manufacturing, finance, retail and commerce. *See* Tr. 2450:14-51:3 (Pichai) ("[GenAI] has the potential to positively impact society in the deepest possible way across every human endeavor."); Tr. 4054:8-55:14 (Hitt (Google Expert)).

977. Google has incorporated GenAI technology into a broad range of products, services, and research endeavors, including many unrelated to web search. For example, Google

researchers have developed a technology called AlphaFold to predict the structures of proteins, which "solved the 50-year grand challenge of protein folding." RDX0042A at .002; Tr. 3325:9-13 (Collins). Google DeepMind CEO Demis Hassabis was a recipient of the Nobel Prize in Chemistry for his work on AlphaFold. Tr. 204:13-19 (Durrett); Tr. 3317:16-23 (Collins).

978. Other examples include Google's deployment of GenAI to: assist its Waymo line of self-driving cars to drive independently, Tr. 2449:18-50:13 (Pichai); generate computer code, Tr. 2449:18-50:13 (Pichai); develop the NotebookLM product that allows a user to upload content and have a natural-language discussion with the software regarding that content, Tr. 3329:22-33:12 (Collins); RDXD-21; RDXD-22; RDXD-23; RDXD-24; and use natural language to search through a user's photos, Tr. 3328:17-24 (Collins).

979. Indeed, today, GenAI technology is incorporated into every single product of significance at Google. Tr. 3329:13-16 (Collins).

980. Consistent with its widespread application and transformative potential, artificial intelligence is one of the most profound technologies that humanity will ever work on. Tr. 2450:14-51:3 (Pichai); *see also* Cromwell (Microsoft) (30(b)(1)) Dep. Tr. 42:13-18 (agreeing that "[t]he coming AI wave is the biggest and potentially most consequential technology shift of our lifetimes").

981. The use of GenAI begins with the training of a foundation model. Scores of companies and institutions have developed such models. Tr. 4034:13-35:20 (Hitt) (testifying about RDXD-32.013). Among the better known are those from OpenAI, Google, Anthropic, Meta, xAI, and DeepSeek. Tr. 3334:12-21 (Collins); Tr. 4044:18-45:19 (Hitt) (testifying about RDXD-32.020).

982. A foundation model is "pretrained" through a process that involves exposing the model to very large amounts of data. Tr. 155:23-56:16 (Durrett); Tr. 4024:24-26:9 (Hitt).

983. One dataset that Google has used to train its Gemini foundation models is the Google Common Corpus ("GCC"). Tr. 3346:8-17 (Collins). The GCC does *not* contain proprietary search data, and other companies can replicate it if they choose to. Tr. 3346:8-23 (Collins); Tr. 4194:1-13 (Hitt).

984. There is no evidence in this case showing that other companies are prevented from training their GenAI models on the same data included in the GCC. Tr. 210:23-11:21 (Durrett) ("Q. So you don't know one way or the other whether what Google trains on from the Google Common Corpus is equally available to somebody else who decides to devote the resources to crawling the web? . . . [A.] I don't specifically know what the technical barriers are to an outside firm, if they would be able to -- if they would be able to produce that or not. But my understanding is that it is a challenging process, to my knowledge. Q. It is a challenging process, but you don't know whether it is something that is beyond the achievement of a company like Microsoft or OpenAI or Meta. Correct? A. That's correct.").

985. Search engine click-and-query data is not used to train GenAI foundation models, whether at Google or elsewhere. Tr. 3347:6-8 (Collins) ("Q. Mr. Collins, has Google looked at using search data for pre-training models that would be used in Search? A. We don't currently do that, no."); Cromwell (Microsoft) (30(b)(1)) Dep. Tr. 64:7-10 ("Q. To your knowledge, does Microsoft use any click-and-query data to train any model that's used in the consumer-facing Copilot application? A. Not that I'm aware of."); Tr. 520:11-25 (Turley (OpenAI)) ("'Aside from building an index, are there other uses of click-and-query data that OpenAI finds valuable, for example, the training of models? Answer: No.'").

986. Google once looked into pretraining its foundation models that would be used in the search product area with search user-interaction data, but found it was not worth the cost. Tr. 3347:6-16 (Collins) ("Q. And what was the conclusion that Google reached with respect to the utility of pre-training models using search data even just for search products? A. In general, and even for search products, the benefits of pre-training on search data are not worth the cost.").

987. As discussed *infra* in Section VII.F, there is vibrant competition among foundation models.

C. AI and GenAI Have Facilitated Search Engine Improvements and Made Search More Competitive.

988. Among its many applications, AI and GenAI technology have been used to improve GSEs.

989. For over a decade, Google has incorporated AI into search. *See* Liability Op. FOF ¶ 109 ("Beginning in 2015, Google increasingly began to incorporate AI technologies into its search processes.").

990. Among other tasks, Google Search has used this technology to improve the process of understanding queries and the documents that may be shown in response to them. *See* Liability Tr. 7404:12-06:3 (Raghavan (Google)) ("So we brought that in in 2018, and have been using it for document and query understanding for a while, okay."); *see also* Liability Op. FOF ¶ 110 ("AI technology has accelerated search quality with respect to spelling corrections or semantically related concepts, without relying on user data.").

991. Google found that the incorporation of AI (and GenAI) into its search products has led to some of the largest performance improvements in the history of Google Search. Tr. 2456:10-57:4 (Pichai); Tr. 3547:4-49:15, 3450:19-52:3 (Reid).

992. Microsoft has also incorporated GenAI to considerable effect. Microsoft found that the incorporation of GenAI into its search products led to the single biggest relevance gain in the history of Bing. Tr. 1045:17-46:2 (Schechter (Microsoft)) ("Q. In fact, Microsoft found that Bing achieved the biggest relevance gain in the history of the product when it started using the GPT model; isn't that right? A. Yes").

993. For example, Microsoft had historically relied on human beings to make relevance determinations to determine the quality of search results displayed in response to user queries. Tr. 1046:17-47:1 (Schechter). Microsoft has since turned that process over to OpenAI's GenAI technology. Tr. 1047:24-48:1, 1045:17-46:2 (Schechter). Compared with humans, the models were more accurate, about ten times faster, and about one twentieth the cost. Tr. 1048:2-14, 1051:23-52:13 (Schechter); RDX0378 at .008.

994. Microsoft believes that it has begun to close its quality gap with Google. *See* Tr. 1052:17-53:8 (Schechter).

995. The experience of Microsoft's search advertising business has been similar. Microsoft has recently begun using LLMs to judge the relevance of advertisements as well. Utter (Microsoft) (30(b)(6)) Dep. Tr. 31:14-32:4; RDX0324 at .009. As in search, Microsoft found that LLMs could be "used to weed out lower quality ads, and the result is higher quality ads show[n]." Utter (Microsoft) (30(b)(6)) Dep. Tr. 33:6-35:11.

996. Microsoft believes it has closed its ad defect rate gap with Google. Utter (Microsoft) (30(b)(6)) Dep. Tr. 37:7-20; RDX0324 at .009.

D. Generative Artificial Intelligence Chatbots Have Myriad Uses and Do Not Serve as "Search Access Points."

997. One use of GenAI is for a "chatbot." Examples of "chatbot" applications include: OpenAI's ChatGPT, Anthropic's Claude, xAI's Grok, Perplexity AI's Perplexity, Meta's Meta

AI, DeepSeek's eponymous application, Microsoft's Copilot, and Google's Gemini App. Tr. 4044:18-45:19 (Hitt) (testifying about RDXD-32.020). Chatbots are based on foundation models discussed above.

998. GenAI chatbots are available on both desktop and mobile. The primary way that users interact with GenAI services is through the web, not through mobile applications. *See* Tr. 4062:25-64:13 (Hitt) ("[A]t least for the data we've seen from OpenAI, desktop is -- I think at least the majority of the queries come through desktop."); RDX0616* (OpenAI data showing substantially more desktop usage than mobile).

999. GenAI chatbots and GSEs serve different purposes (albeit with some instances of overlap). Although chatbots and GSEs share some use cases, chatbots and their underlying models are fundamentally different technologies than GSEs. *See, e.g.*, Tr. 2457:5-58:9 (Pichai); Tr. 3373:18-25 (Collins); Tr. 205:24-06:11 (Durrett) ("[GPT] models are large language models and are different than general search engines."); Tr. 205:10-12 (Durrett) ("And it's your testimony that these GenAI products are different from general search engines. Correct? A. That's correct.").

1000. Even for users entering an information-seeking prompt into a chatbot, Plaintiffs' economist Dr. Chipty agreed that rival chatbot providers "think one of their competitive advantages is providing a different type of response to a user" than the user would receive from a search engine. Tr. 4625:2-13 (Chipty (Plaintiff Expert)).

1001. GenAI chatbots and GSEs function differently. When a user submits a query to a chatbot, the model makes a prediction about the answer, drawing upon the data used to train the model. Tr. 155:4-22 (Durrett) ("[The transformer] takes as input this sequence of tokens and outputs this probability distribution over all of these words in the vocabulary.").

1002. Chatbots have many use cases, including composing texts, generating computer code, creating novel images and video, and tutoring users on chosen subjects. Tr. 480:7-81:4 (Turley) ("[Q.] The product that is currently known as ChatGPT has many use cases; correct? A. Yes."); Cromwell (Microsoft) (30(b)(1)) Dep. Tr. 78:6-19 ("Q. What are the different use cases that you see people using Copilot for? A. Just about everything. . . . I think there's a lot of different use cases for -- for Copilot ranging from learning how to code or researching, you know, a -- using it as a -- a study assistant, essentially, in a student context, all the way to, you know, planning a trip or iterating on a -- on an email or document or emotional support. There's quite a wide range.").

1003. Plaintiffs' RPFJ broadly defines "Search Access Point" to include GenAI Products like Google's Gemini App that "can retrieve and display information from a GSE, including links to websites." Pls.' RPFJ § III.V. The evidence demonstrates that the Gemini App does not serve as a meaningful entry point to search and there is no reason to treat it in the same manner as a search widget or browser.

1004. The Gemini App allows a user to interact with the Gemini chatbot via its website and via an iOS or Android mobile application. Tr. 625:6-15 (Hsiao).

1005. The Gemini App has many use cases. For example, consumers can use the Gemini App to have a spoken, natural-language conversation, to brainstorm new ideas, to prepare for a job interview, to check how long it will take to drive to work, to check the weather, to draft a birthday-party invitation, to ask questions about pictures, and to generate novel, never-before-seen images and videos. Tr. 672:6-74:1 (Hsiao). Much of the content that the Gemini App presents is entirely new and existed nowhere on the internet prior to its generation. Tr. 677:2-13 (Hsiao).

1006. Elizabeth Reid, the head of Google Search, testified that she does not consider the Gemini App to be a search access point because while the app "has a link to see more for a particular search on Google[,] . . . that doesn't really cause a user to build up this mental model [of going] to the Gemini app in order to get to Search." Tr. 3546:13-47:3.

1007. Because the purpose of the Gemini App when given an information-seeking prompt is to answer a question, it would represent a failure of the product if a user must then conduct a Google Search to retrieve responsive information. Tr. 664:16-65:8 (Hsiao) ("I actually think if the user has to search after using Gemini, it's a failure of the product. Like, the point of Gemini is to help you answer the question and help you get things done with the AI. If you then have to use another tool, you know, that's not our desired outcome, actually, as the provider of the product.").

1008. The Gemini App drives little traffic to Google Search. Tr. 664:16-65:8 (Hsiao) ("I would say Gemini does not drive much, if any, meaningful traffic to Search today.").

1009. Although the Gemini App can include a "G" icon that a user can use to conduct a web search, that functionality has not always been present in the product and is very rarely clicked. Tr. 642:2-5 (Hsiao) ("Q. And the G button appears at the bottom of pretty much every Gemini app response; is that right? A. At one point in the product, we had removed the G button. It appears to be back right now."), Tr. 644:16-23 (Hsiao) ("A. It's not a Google Search system. It's something that the Gemini app team built. It didn't exist in Google Search before. So this corroboration is a novel creation of the Gemini app team."), Tr. 664:16-65:8 (Hsiao) ("Earlier, we looked at the search results-related panel. That was an early feature that was really around trying to help with hallucinations. It's very rarely clicked.").

1010. The "related search" function accessible via the "G" icon does not turn the Gemini App into a search access point. Users who take advantage of this feature can select one of the queries Gemini provides under "Search related topics," and selecting such query brings the user to Google Search. Google's internal figures show that only [redacted]% of user prompts result in the option "related searches" being presented. And only [redacted]% of user prompts in total result in the use of this function. Tr. 4059:22-61:8 (Hitt) (discussing RDXD-32.030).

1011. Microsoft's perspective with respect to its chatbot, Copilot, is similar. The "purpose" of Copilot is not "to drive traffic to Bing." Cromwell (Microsoft) (30(b)(1)) Dep. Tr. 40:15-17.

1012. Plaintiffs' economic expert Dr. Chipty agreed that she had seen no evidence suggesting that Google intends to turn the Gemini App into a search access point. Tr. 4624:18-25:1 (Chipty).

E. There Is No Basis to Mandate Google Ground Its Rivals' Products.

1013. "Grounding" refers to the process of anchoring the output of a GenAI model on factual information or an external database. Tr. 3336:4-7 (Collins). Three separate provisions of the Plaintiffs' RPFJ relate specifically to grounding: §§ V.B.1., VI.A., VII.A.5.

1014. The information used for grounding may be retrieved from any number of places, including web indices, data feeds, a company database, or particular media that the user provides to the model. Tr. 3336:8-25 (Collins); Tr. 4030:1-32:9 (Hitt).

1015. Grounding comes with tradeoffs: Because grounding requires the retrieval of information outside the model, grounding requires the model to call another service, which slows the product down. Tr. 3337:1-10 (Collins).

1016. For many chatbot use cases, there is no need for grounding on search results, or grounding more generally. Tr. 640:20-41:8 (Hsiao) ("So the way it works is, when the model

gets the prompt, it can decide to optionally call Search for additional information that helps it answer the question . . . ."); Tr. 481:18-83:19 (Turley); RDX0356 at .011 ("Search's [redacted] daily searches are [redacted] of ChatGPT user messages."). Indeed, during its meteoric rise, ChatGPT was not grounded for the majority of its users. Tr. 503:11-18 (Turley).

1017. The Gemini App does not always trigger a grounding call in response to a query. Tr. 3337:11-15 (Collins) ("[Q.] Does the Gemini app always trigger a grounding call when there is a user prompt? A. No."). The Gemini App only calls upon the Search API for grounding on around [redacted]% of prompts. Tr. 4032:12-33:1 (Hitt); RDXD-32.012.

1018. When the Gemini App does require grounding for a query, it does not necessarily use search for that grounding. Tr. 625:16-19 (Hsiao); Tr. 3337:16-24 (Collins) ("Q. And does the Gemini app exclusively use search for its grounding? A. No. Q. And what are some different sources that the Gemini app can use for grounding beyond search? A. The Gemini app integrates with a number of Google services beyond search. So YouTube, flights and hotels, photos, it also is able to ground on Workspace. So your documents or email or calendar.").

1019. Plaintiffs have not adduced any evidence that Google receives a material or determinative competitive advantage from its grounding capabilities. While Plaintiffs' expert Professor Durrett considers grounding useful to models generally, he had no opinion as to whether "Google's grounding makes its models superior to the models produced by its competitors." Tr. 216:21-24 (Durrett).

1020. Rivals can successfully ground their models on web data without using Google Search.

1021. For instance, a rival can build its own index, as OpenAI has been investing in doing so. Perplexity has had retrieval capability for a very long time, and is building its own index for its models. Microsoft, of course, has Bing. Tr. 4030:1-32:9 (Hitt).

1022. Google's GenAI rivals have not found the construction of an index to be cost prohibitive. Tr. 392:24-93:5 (Turley) ("Q. And, Mr. Turley, is one of those further alternatives to build your own search index technology? A. Yes. It became clear over time that it was not a viable to depend on reference one in the long run. It was, at best, a near-term solution, which is in part why we kicked off our own internal efforts."); Tr. 697:15-17 (Shevelenko (Perplexity)) ("[Q.] And from where does Perplexity retrieve those documents or snippets? A. From our web index."); Tr. 796:8-17 (Shevelenko) (agreeing that Perplexity has built an index of a size that is approaching the point of diminishing returns and entailed less than $10 million in raw costs).

1023. In addition, rivals can license a web search API from others to ground their GenAI products. Both Bing and Brave license their technology. Tr. 4030:1-32:9 (Hitt).

1024. It is not essential to use Google Search in order to effectively ground a GenAI product. Tr. 4030:1-32:9 (Hitt).

1025. Indeed, industry benchmarks show that Google's *grounded* models and those of its rivals are constantly jockeying for top position, with no company dominating—including in areas like "factuality." Tr. 3379:3-10 (Collins); Tr. 4039:7-40:13 (Hitt); RDXD-32.016.

F. The GenAI Field Is Highly Competitive and Does Not Require the Intervention of the Court.

1026. The record evidence is unequivocal: The generative AI space is very competitive. Tr. 503:25-04:4 (Turley) ("Q. And let's talk about the generative AI space. . . . You consider that space to be very competitive; correct? A. Yes, absolutely."); Tr. 3335:19-23 (Collins) ("[Q.] How would you describe the current level of competition with respect to foundation models as

compared to the course of competition over the years that you've seen? A. [It] is the most competitive market I've ever worked in."); Tr. 685:4-23 (Hsiao); Tr. 2461:14-62:9 (Pichai); Tr. 409:11-10:22 (Turley) (testifying that the GenAI space is "very competitive"); Tr. 4626:19-27:3 (Chipty) (observing that the GenAI space "sure sounded highly vibrant and competitive."); Cromwell (Microsoft) (30(b)(1)) Dep. Tr. 19:8-20 ("There are many competitors in this space.").[8]

1027. Indicia of the highly competitive nature of the GenAI space include:

- The number of competitors and new entrants;
- The quality of products and models;
- Google's rivals' widespread distribution and usage;
- Google's modest share of usage in the GenAI space;
- Google's rivals' ability to attract substantial investment;
- Google's rivals' ability to earn substantial revenue;
- Google's rivals' ability to develop valuable and respected brands.

1. There are Many Competitors and New Entrants in the GenAI Field.

1028. In recent years, a substantial number of companies (including many leading technology companies) have developed foundation models. *See supra* ¶ 981 (noting models developed by OpenAI, Google, Meta, xAI, DeepSeek, and Anthropic); Tr. 794:1-6 (Shevelenko) ("Q. Many companies train their own foundation models, do they not? A. It's expensive. But, yeah, there's at least six major companies that do it. Q. Who do you have in mind? A. OpenAI, Anthropic, xAI, Google, Meta."); Tr. 4036:19-39:4 (Hitt) ("You see entrants like Grok or

[8] References to the "market" in this Section reflect a non-technical shorthand to collectively refer to AI and GenAI chatbots.

DeepSeek, that may not have existed six months ago, are now able to reach the level of performance to wind up in the top ten of these models.").

1029. The trend of rapid new entry continues. For example, in December 2024, the Chinese AI lab DeepSeek released its eponymous chatbot and almost overnight reached tens of millions of users. Tr. 2458:10-60:15 (Pichai).

1030. To take another example, xAI recently launched its Grok chatbot, which quickly became one of the top three downloaded applications on mobile phones. Tr. 2477:13-79:2 (Pichai) ("[I]f you go today to the top downloads, Grok is one of the top three downloaded applications on mobile phones."); Tr. 685:4-23 (Hsiao) ("It's explosive growth. There's new entrants. I mean, even between these two slides, you see slightly different lists at the bottom. You know, Grok, DeepSeek, all sort of new emerging models that are really, really strong."); RDXD-04.007-.008 (showing, as of March 28, 2025, that Grok had approximately 15 million daily active users and approximately 75 million daily queries and that DeepSeek had approximately 10 million daily active users and approximately 50 million daily queries).

2. Rival GenAI Products Are of High Quality.

1031. Plaintiffs have not offered any evidence that Google has market power or otherwise has a leading position in the GenAI space with respect to model or product quality, let alone that there is a material advantage to Google with respect to foundation models. Tr. 212:24-14:23 (Durrett); *see also* Tr. 216:25-17:8 (Durrett) ("[Q.] You have no opinion as to whether Google's generative AI foundation models are superior to the foundation models made by its competitors. Correct? A. That's correct. That's outside the scope of the assignment that I was given here."); Tr. 217:9-21 (Durrett) ("Q. You are not here today to offer an opinion that Google's foundation models are superior to those of OpenAI, Meta or Microsoft or anybody else. Correct? A. That's correct . . . ."); Tr. 2303:14-17 (Chipty) ("Q. Just quickly back to generative

AI, you've not offered any opinion in this case that the Gemini app has market power in any market; correct? A. That's correct."); Tr. 4626:19-27:3 (Chipty) ("[Q. The GenAI] space is highly competitive, we can agree on that? A. So I'm going to take Dr. Hitt's characterization of that. I have no reason to doubt it. It sure sounded highly vibrant and competitive, yes.").

1032. No firm has established a commanding lead with regard to the relative quality of models and products in the GenAI space; there is constant jockeying for a lead. Tr. 687:15-88:2 (Hsiao) ("[N]o model ever demonstrates a significant lead above the others. If it is better, it's sort of a little better, and then another provider will come and make their model like a little bit better than the previously best one. So it's very -- it's very tight."); Tr. 3372:13-19 (Collins) ("THE COURT: Okay. I mean, just do you have a sense of where Gemini ranks relative to some other products on that score? And maybe that's too simple of a question. THE WITNESS: Yes. We -- we and other leading models are similar in we are constantly jockeying. So there are times when other models are better and there are times in which we are better."); Tr. 4036:19-39:4 (Hitt).

1033. Over the past several years, all models have improved substantially in terms of quality. Tr. 688:3-12 (Hsiao); Tr. 4040:16-41:8 (Hitt).

1034. There is no evidence in the record that rivals are unable to build a GenAI product to compete with Gemini; to the contrary, the record evidence demonstrates that rival models and chatbots can and do compete with Gemini on quality. Tr. 685:24-86:14 (Hsiao) ("One day, one model will be better; two weeks later, another provider will come up with a new model [that is] better. And so there's constant competition for which model is most performant and preferred by providers."); Tr. 793:9-15 (Shevelenko) ("Q. You believe that Perplexity's assistant is better than Gemini? A. It's not just us that believes it. If you read our blog posts there's numerous

journalists that have affirmed that as well. Q. But you believe it. Correct? A. Yes, it's a great product."); Tr. 3840:13-42:1 (Cue (Apple)) ("OpenAI is the best one today.").

3. Rival GenAI Products Have Achieved Widespread Distribution and Usage.

1035. ChatGPT is one of the fastest-growing products of all time. Tr. 512:22-513:4 (Turley) (agreeing that, among other strengths, OpenAI has "one of the fastest-growing products of all time"); RDX0355 at .005; Tr. 3825:7-29:2 (Cue).

1036. Google has estimated that, as of March 28, 2025, ChatGPT had approximately 160 million daily active users, nearly double the number estimated roughly half a year earlier. RDXD-04.007-.008 (indicating that ChatGPT had ">90M" "DAUs" as of October 16, 2024 and "~160M" "DAUs" as of March 28, 2025); Tr. 682:13-83:10 (Hsiao) (noting that the slide presents "daily active users"); RDX0048 at .006; *see also* PXR0072 at -442 ("OpenAI 2025 Strategy" document noting that ChatGPT had [redacted] daily active users by end of 2024).

1037. OpenAI expects to have [redacted] daily active users by the end of 2025, more than [redacted] its number of daily active users at the end of 2024. PXR0072 at -442 (showing [redacted] daily active users at the end of 2024 and [redacted] daily active users for the 2025 base case); Tr. 493:14-22 (Turley).

1038. ChatGPT's monthly active user counter has grown faster than any other stand-alone consumer internet product that Google has ever tracked, including TikTok, Pinterest, Twitter, Facebook, Instagram, and Snapchat. RDX0048 at .003.

1039. Google estimated that, as of March 28, 2025, ChatGPT received approximately 1.2 billion queries every day, double the number estimated roughly half a year earlier. RDXD-04.007-.008 (indicating that ChatGPT had "600M" daily queries as of October 16, 2024 and "1200M" daily queries as of March 28, 2025); Tr. 684:6-13 (Hsiao).

1040. Google has estimated that, as of March 28, 2025, MetaAI had approximately 100 million daily active users, more than double the number estimated roughly half a year earlier. RDXD-04.007-.008 (indicating that MetaAI had ">40M" "DAUs" as of October 16, 2024 and "~100M" "DAUs" as of March 28, 2025); Tr. 682:21-83:10 (Hsiao) (noting that the slide presents "daily active users").

1041. Google estimated that, as of March 28, 2025, MetaAI received more than 200 million queries every day, approximately double the number estimated roughly half a year earlier. RDXD-04.007-.008 (indicating that MetaAI had ">100M" daily queries as of October 16, 2024 and ">200M" daily queries as of March 28, 2025); Tr. 684:9-13 (Hsiao).

1042. Perplexity projects that, by the end of 2027, it will have [redacted] million monthly active users and will serve responses to nearly [redacted] billion queries per day. RDX0363A at .004 (showing "Daily Queries (millions)" for 2027 as "[redacted]" and "MAU (millions, EOP)" as "[redacted]"); Tr. 738:9-39:23 (Shevelenko).

1043. Plaintiffs have offered no evidence that Google's share of usage in the GenAI space exceeds its rivals'; to the contrary, the record is clear that OpenAI is the leader in the GenAI space. Tr. 479:18-23 (Turley) ("Q. Do you agree that OpenAI is known as the market leader in AI? A. One could describe it that way, depending on the context. Q. And do you agree that to many people, OpenAI is AI? A. For many consumers, I could imagine that being the case."); Tr. 2463:19-21 (Pichai) ("THE COURT: And you consider the market leader to be? THE WITNESS: OpenAI with its ChatGPT product.").

1044. OpenAI calculates ChatGPT's U.S. web market share to be approximately 85%, far in excess of Claude (3%), Gemini (7%), Perplexity, or Copilot. RDX0355 at .029.

1045. Rival GenAI providers have succeeded in obtaining distribution agreements with prominent OEMs for distribution in the United States and there is no evidence that Google (or any other provider) has entered into exclusive distribution agreements with regards to the distribution or promotion of GenAI applications.

1046. OpenAI has a "deep partnership with Apple" that involves making OpenAI's technology available to power Apple Intelligence and to integrate ChatGPT into Apple devices in exchange for a share of OpenAI's revenue. Tr. 468:1-18, 468:23-69:7 (Turley).

1047. Google competed for—but did not win—the Apple deal that OpenAI secured for ChatGPT. Tr. 2474:10-19 (Pichai) ("And in the case of Apple, that's an area where we didn't have success, and Apple has chosen to integrate ChatGPT, and ChatGPT has a distribution relationship with Apple."); Tr. 3838:21-39:18 (Cue).

1048. The integration of OpenAI technology into Apple devices went into effect in December 2024. Tr. 499:12-25 (Turley); RDX0148 at .001.

1049. OpenAI has also recently entered into a large partnership with T-Mobile. Giard (T-Mobile) Dep. Tr. 51:18-52:5 ("Q. And what high-profile partnerships has T-Mobile engaged in? A. We announced a large partnership with OpenAI in September of last year.").

1050. OpenAI has also partnered with Yahoo to incorporate OpenAI's technology into Yahoo's search services. Tr. 1277:22-78:13 (Provost (Yahoo)).

1051. OpenAI's technologies are also incorporated into DuckDuckGo's Duck.ai chat service. Tr. 1005:22-06:1 (Weinberg (DuckDuckGo)) ("Q. And in duck.AI, users can converse with a third party AI model developed by OpenAI, Anthropic or Meta; is that right? A. Yeah.").

1052. OpenAI's technologies are similarly incorporated into Bing and Microsoft Copilot. Tr. 1038:17-39:2 (Schechter) ("THE COURT: Can I ask you a question. What's the

relationship between CoPilot and Open AI and Microsoft's relationship with OpenAI? THE WITNESS: I don't know all the models being used by CoPilot today, but certainly the GPT models -- we launched Bing Chat with GPT-4, and various models from OpenAI continue to get used by CoPilot and by the Bing experience.").

1053. Contrary to Mr. Turley's "understanding" that OpenAI broke off discussions with Samsung because OpenAI believed it could not offer sufficient money to interest Samsung in a deal, Tr. 472:19-73:22 (Turley), negotiations between OpenAI and Samsung broke down because [redacted]

1054. Like OpenAI, Perplexity has also succeeded in partnering with OEMs and browsers to help distribute its product.

1055. Perplexity has a distribution deal with Motorola under which Motorola will preload Perplexity's application, and allow users to invoke it via a hardware button on new high-end devices. Tr. 717:18-718:2 (Shevelenko) ("[Q.] And what devices will the Perplexity app be pre-loaded on with [Motorola]? A. New devices on one of their kind of higher end lines of -- of mobile device."); PXR0805 (Plaintiff Rosetta stone); Tr. 747:3-8 (Shevelenko); RDX0152 (Google Rosetta stone); *see also* Tr. 363:18-22 (Fitzgerald (Google)); Tr. 3905:3-19 (Samat (Google)) (explaining that Motorola's new Razr device "will have their own assistant called Moto AI, which includes Perplexity and CoPilot accessible on the device, invoked by a dedicated hardware button").

1056. Perplexity is in the process of negotiating a distribution deal with [redacted]. Tr. 714:14-17 (Shevelenko) ("Q. Is Perplexity close to a deal with Company E to obtain distribution of Perplexity's products? A. I hope so, but, you know, we're -- it's a top priority for us, but there's nothing signed yet."); PXR0805 (Rosetta stone identifying Company E as [redacted]).

1057. Perplexity is also negotiating terms to be included in Mozilla's browser. Tr. 749:17-23 (Shevelenko); RDX0152 at .001 (identifying Mozilla as Company H).

1058. Motorola has agreed to distribute Microsoft's Copilot. Tr. 363:18-22 (Fitzgerald) ("Q. What do you know about what Motorola is doing with other GenAI service providers? A. On some new devices that are soon to be launched, they'll be in a partnership with Perplexity. They'll have a partnership with CoPilot as well.").

1059. As of the close of fact discovery, Microsoft was in the midst of Copilot distribution negotiations with OEMs. Beard (Microsoft) Dep. Tr. 101:2-6 ("[redacted]"); LaFlamme (Motorola) Dep. Tr. 128:15-20 ("Q. Is Motorola planning to continue discussions with Microsoft relating to Copilot? A. Yes.).

1060. The fact that Microsoft had not already secured mobile distribution deals for Copilot is attributable, in part, to product-quality issues. [redacted]. RDX0086* at .003.

1061. Microsoft has worked to improve its underlying system with an improved one, Picasso. That work was not accomplished until October 2024, long after OpenAI consummated its ChatGPT deal with Apple and Google consummated its Gemini deal with Samsung. Beard (Microsoft) Dep. Tr. 18:4-5 ("Q. When did Copilot first start to rely on Picasso? A. October 2024.").

1062. Microsoft's limited distribution likewise is not attributable to a preference on the part of OEMs to preload just one GenAI service. To the contrary, the record is clear that OEMs can and do preload multiple GenAI products on the same device. *See, e.g.*, Tr. 364:15-20 (Fitzgerald) ("Perplexity and CoPilot and Gemini will all be offered side by side on the same device" in Moto AI integration); Kim (Samsung) Dep. Tr. 189:7-15 ("Q. Mr. Kim, did you ever tell Google about your discussions with Microsoft regarding placing -- potentially placing Copilot on the S25? A. I -- we -- I told Google that we were talking to everybody. We're not doing anything exclusive. Q. Did you tell Google you were talking to specific potential partners or just everybody? A. Everybody.").

1063. Like its rivals, Google has entered into distribution and promotion agreements for its chatbot product, the Gemini App. *See* RDX0432 (Google-Samsung Gemini Commercial Agreement); RDX0423* (Google-Motorola Google One AI Premium OEM Promotion Agreement); RDX0428* (Google-Lenovo Marketing Agreement).

1064. Google's Gemini Commercial Agreement with Samsung is non-exclusive, allows Samsung to terminate at least annually, and allows Samsung to preload and assign access points, including hardware affordances and hot words, to alternative GenAI services. Kim (Samsung) Dep. Tr. 70:20-72:22 ("Q. Is it possible under [Gemini Commercial Agreement] for Samsung to preload a different AI application on default home screen? A. Yes. Q. Is it possible under this

agreement for Samsung to promote different AI applications? A. Yes."); RDX0432 at .009 (§ 4.7), 012-13 (§ 8.1).

1065. Google's Google One AI Premium OEM Promotion Agreement with Motorola is likewise non-exclusive, short-term, and allows Motorola to preload alternative GenAI services. RDX0423* at .006 (§ 2.3). Similarly, Google's Mobile Incentive Agreement with Motorola presently in effect is not exclusive and does not restrict alternative search, assistant, or generative AI services from being on a device. RDX0442 at .002 (§ 2.3); PXR0607 (Apr. 16, 2025 Waiver Letter from Google to Motorola); *see also* Tr. 356:14-24 (Fitzgerald).

1066. Google also has—or, at the time of the evidentiary hearing, was negotiating the terms of—an RSA with each of the three major wireless carriers: Verizon, AT&T, and T-Mobile.

1067. Google's RSA with Verizon permits non-Gemini GenAI services to be preloaded on a device. *Compare* DX0912* at .012 (Google-Verizon Mobile Revenue Share Agreement) (providing in § 4.2(a)(i) that Verizon must "ensure . . . that Google Assistant is preloaded on Core Devices"), *with* PXR0609 at -073 (Apr. 17, 2025 Waiver Letter from Google to Verizon) (waiving § 4.2(a)(i)); *see also* Tr. 359:21-60:3 (Fitzgerald).

1068. Google's RSA with AT&T permits non-Gemini GenAI services to be preloaded on a device. *Compare* DX0910* at. 012 (Google-AT&T Mobile Revenue Share Agreement) (prohibiting in § 4.2(a)(i) the preinstallation of any "Alternative Service"), *with* PXR0606* at -035 (Apr. 16, 2025 Waiver Letter from Google to AT&T) ("Google waives all requirements imposed on the Company under Sections 4.1(a)(i) and 4.2(a)(ii) of the agreement."); *see also* Tr. 361:9-17 (Fitzgerald).

1069. At the time of the evidentiary hearing, Google and T-Mobile were renegotiating their RSA, and, under Google's proposal, non-Gemini GenAI services would be permitted as a preload on a device without reducing T-Mobile's RSA payments. Tr. 362:8-21 (Fitzgerald).

4. GenAI Firms Have Access to Abundant Capital.

1070. With respect to GSEs, the Court has found that, due to "the extraordinary resources required to build, operate, and monetize a GSE, venture capitalists and other investors have stayed away from funding new search ventures." Liability Op. FOF ¶ 56.

1071. By contrast, new entrants into the GenAI field have found little difficulty raising substantial sums of money, including from venture capitalists. *See* Tr. 733:13-16 (Shevelenko) ("Q. Perplexity is in the course of raising more funds now; is that right? I think every AI company is in some state of fundraising."); Tr. 4048:15-49:20 (Hitt) ("[A] lot of firms have demonstrated they've been able to raise resources, you know, resources that might be substantial. . . . So in terms of capital, I think that seems to be, at the moment, plentiful.").

1072. OpenAI recently announced that it has raised an additional $40 billion in capital at a valuation of $300 billion. Tr. 498:8-14 (Turley).

1073. OpenAI has received substantial investment from, among many other prominent and well-capitalized investors, Microsoft, a company that has, in turn, provided OpenAI with cloud-computing resources and the ability to integrate OpenAI's models into a wide array of consumer- and enterprise-facing software products. *See, e.g.*, Tr. 1045:7-9 (Schechter) ("Q. And I believe you're aware that Microsoft is permitted to use certain OpenAI models in various products? A. That's my understanding."); Liability Tr. 3599:10-3600:21 (Nadella (Microsoft)) ("Q. Now, Microsoft and OpenAI entered into a partnership in the summer of 2019; is that right? A. Sounds accurate. . . . Q. And Microsoft has invested over $13 billion in OpenAI over the

years now? A. Sounds correct."); DX0296* at .003 ("ChatGPT and GPT-3.5 were trained on [Microsoft's] Azure AI supercomputing infrastructure.").

1074. Perplexity has completed several rounds of fund-raising from well-known investors. Tr. 732:17-19 (Shevelenko) ("Q. Well, Perplexity's completed several rounds of fundraising from well-known investors, has it not? A. Yes.").

1075. Over the course of its fundraising rounds, Perplexity's valuation has surged—from roughly $1 billion in spring 2024, to $9 billion in December 2024, and to even higher levels today. Tr. 733:3-34:15 (Shevelenko).

5. Rival GenAI Firms Have the Ability to Generate Considerable Revenue.

1076. Plaintiffs have adduced no evidence that Google's GenAI rivals have struggled to monetize their businesses; to the contrary, the record is clear that they have begun earning impressive revenues and forecast earning even more in the future.

1077. The record indicates that companies competing in the GenAI space have a range of options when it comes to monetizing their products, including consumer subscription fees, enterprise solutions, fees for using the service via API, and sponsored content. *See, e.g.*, Tr. 627:22-25 (Hsiao) ("Q. So there's two versions of the Gemini app, there's the free version and there's the paid subscription version, which is called Advanced; is that right? A. Yes."); Tr. 703:13-16 (Shevelenko) ("Q. And does Perplexity show ads in this part of the results page? A. We're experimenting with showing sponsored follow-up questions."); Tr. 704:4-8 (Shevelenko) ("Q. Does Perplexity monetize its product in any other ways? A. We have subscription versions of Perplexity, so Perplexity Pro and Perplexity Enterprise Pro. And we have our API offerings, yep."); RDX0352 at .014 (referring to "Business (High Price Tier),"

"Business (Mid Price Tier)," "Business (Low Price Tier)," "API," and "Regular Paying Users" as part of OpenAI's monetization plan).

1078. OpenAI's total revenue has recently reached approximately [redacted] on an annualized basis. PXR0072 at -430; *see also* RDX0048 at .009 (Google analysis concluding "OpenAI's total revenue has now likely exceeded $4B in ARR with most of the recent growth coming from ChatGPT Plus").

1079. OpenAI "expect[s] to reach [redacted] in revenue in FY'29 with [redacted] gross margins." RDX0352 at .012.

1080. Perplexity has projected that, by 2027, its yearly revenue will reach [redacted]. Tr. 737:13-23 (Shevelenko); RDX0363A at .002.

1081. Underscoring the rapid increase in Perplexity's revenue growth, Perplexity estimates that its annual revenue run rate—that is, a 12-month forward-looking projection of its revenue based on the previous thirty days—would reach [redacted] by 2027. Tr. 737:13-23 (Shevelenko); RDX0363A at .002; *see also* Tr. 737:24-38:5 (Shevelenko) ("THE COURT: I'm sorry, for the -- could you just help, for the uninitiated, what the difference is between a revenue metric and an annualized revenue run rate metric. THE WITNESS: So the run rate is basically a 12-month forward -- like, so based off the last 30 days, you multiply that by 12; whereas revenue is what you've actually got paid that year in total.").

6. Rival GenAI Products Have Strong Brands.

1082. Among search engines, Google has significant brand strength and affinity. *See* Liability Op. FOF ¶¶ 130-33.

1083. Among generative AI models and chatbots, however, Google's Gemini is not the dominant brand. Rather, to many consumers, it is OpenAI that is synonymous with AI. Tr. 479:18-23 (Turley) ("Q. And do you agree that to many people, OpenAI is AI? A. For many

consumers, I could imagine that being the case."). As ChatGPT's head of product recognizes, ChatGPT has a "great brand." Tr. 494:3-8 (Turley).

1084. Microsoft similarly understands that the Copilot brand is valuable and attractive to potential counterparties. *See* Beard (Microsoft) Dep. Tr. 43:21-44:5 ("Q. (By Mr. Yeager) Part of the value of the deal that Motorola would be receiving is the ability to market phone with the Copilot brand on it, correct? A. Yeah, we believe that they valued that.").

1085. Meta has also incorporated its Meta AI functionality into products with some of the best-known brands in the world, including Facebook and Instagram, which respectively enjoy 96% and 94% brand awareness, figures comparable to Google Search. *See* RDX0044* at .008 (setting forth awareness figures); RDX0091* at .016 ("Meta has integrated Llama into all its Facebook products . . . .").

G. Google's GenAI Rivals Already Have the Tools for Success.

1086. OpenAI's H1 2025 Strategy memorandum states that:

> **We have what we need to win**: one of the fastest-growing products of all time, a category-defining brand, a research lead (reasoning, multimodal), a compute lead, a world-class research team, and an increasing number of effective people with agency who are motivated to ship. We don't rely on ads, giving us flexibility on what to build. Our culture values speed, bold moves, and self-disruption. Maintaining these advantages is hard work but, if we do, they will last for a while.

RDX0355 at .005 (emphasis added).

1087. For all its recent stumbles, Microsoft also believes that it has the building blocks to succeed in GenAI:

RDX0329 at .001.

1088. Mark Zuckerberg, the CEO of Meta, has publicly stated his expectation that, "[i]n 2025, . . . Meta AI will be the leading assistant serving more than 1 billion people." RDX0150 at .001.

1089. When OpenAI surveys its competition, it is [redacted], not Google, that it views to be its "biggest threat." RDX0355 at .005 (identifying [redacted] as its "biggest threat," "due to [redacted] ability to embed equivalent functionality across their products (e.g. [redacted]) without facing the business model cannibalization risks that Google does").

H. Plaintiffs' "Self-Preferencing" Proposal Is Based on a Misunderstanding of How Google's Products Work and Would Stifle Product Design Decisions That Are Pro-Consumer and Ubiquitous in the Industry.

1090. Plaintiffs' RPFJ would restrict Google from engaging in certain, vaguely defined conduct that Plaintiffs characterize collectively as "Self-Preferencing." *See* Pls.' RPFJ § V.B.[9]

1. Google's On-Device AI Does Not Prevent or Limit Other On-Device Models.

1091. Plaintiffs' RPFJ states that Google may not "prevent[] interoperability between Android AICore" and "Competitor products and services in the GSE or Search Text Ads markets." Pls.' RPFJ § V.B.1. Plaintiffs contend that "Gemini Nano's exclusive presence as a GenAI model in Android AICore" would violate this provision. RDX0707* at .003-.004.

1092. AICore is a software module made by Google that enables developers who wish to use an on-device LLM to utilize Google's on-device LLM, named Gemini Nano. Tr. 3955:25-56:4 (Samat).

[9] This provision also relates to grounding, which is discussed in Sections V.E and VII.E, *supra.*

1093. AI functionality on a smartphone can be provided in a variety of ways: through an on-device AI model, a cloud-based AI model, or a combination of both. Tr. 2518:5-19:24 (Nieh (Google Expert)).

1094. That an application appears on a device does not mean that it uses an on-device model. The Gemini App, for example, does *not* use an on-device model, and instead relies on cloud-based models. Tr. 3956:16-19 (Samat).

1095. Plaintiffs' expert Professor Mickens opined that on Android devices, "AICore is designed to provide Android apps with access to a model that is accelerated by . . . special hardware" —tensor processing units ("TPU"), and neural processing units ("NPU")—and that "AICore is the gatekeeper . . . for access to the TPU/NPU accelerators." Tr. 1555:11-57:1 (Mickens (Plaintiff Expert)); PXRD010 at 67; *see* Tr. 3962:18-63:4 (Samat) (defining TPU and NPU). Professor Mickens is incorrect that AICore is the only means available for Android apps to access the TPU/NPU accelerators, and Plaintiffs are incorrect that Google's innovations relating to Gemini Nano and AICore amount to "self-preferencing." *See* Samat Tr. 3964:11-66:11; RDXD-30.013.

1096. A variety of companies have developed on-device AI models, including Google. Samsung has developed its own Gauss on-device model, which comes preloaded on its flagship phones, and Motorola has announced that its new Razr phones will come preloaded with Meta's Llama model. Tr. 3964:18-65:19, 3959:19-60:18 (Samat); RDXD-30.013.

1097. A single device may have multiple on-device models; for example, Samsung devices have both Gemini Nano and Samsung's own model, Gauss, on the device. Kim (Samsung) Dep. Tr. 69:24-70:3 ("Q. Is Nano the only on-device model on Samsung

smartphones? A. No. We have our own on-device solution. Q. And what is that called? A. Gauss."); Tr. 3959:19-22, 3968:7-15 (Samat).

1098. There is nothing about AICore that prevents models that are on the device from accessing the device's NPU (or other chips). Tr. 3964:19-65:19 (Samat). AICore is not the only way to access a device's NPU, CPU, or GPU. Tr. 3965:23-25 (Samat). Other on-device model providers are equally able to work with device makers and chip set providers to access a device's NPU, CPU, or GPU; AICore does not have any special advantage. Tr. 3966:1-5 (Samat).

1099. Google has not architected, designed, or built the Android operating system in a way that provides AICore with any special capabilities. Tr. 3966:6-11 (Samat).

1100. There is no limit in the Android operating system to the number of other on-device model containers, like AICore, that could sit next to AICore on an Android device. Tr. 3966:12-68:6 (Samat). A device could have many of them. Tr. 3966:12-68:6 (Samat).

2. Android OS Allows Third-Party "GenAI Products," Including Assistants.

1101. Google does not restrict competitors from developing "GenAI Products" that can compete directly with Google's own applications on Android devices.

1102. *First*, Google makes available to developers the APIs needed to develop an assistive application. Tr. 3877:15-80:14 (Samat).

1103. *Second*, OEMs—not Google—establish default settings on their devices, including the "entry points" to assistant applications. Tr. 3901:17-02:15, 3954:12-17, 3973:8-74:21 (Samat) ("Motorola created a number of different access points to Moto AI and described them in their launch event and their press release.").

1104. *Third*, Android users are able to switch their preferred default assistive app. Tr. 3900:21-23, 3902:6-15 (Samat).

1105. Dmitry Shevelenko of Perplexity testified that, on forthcoming Motorola devices, Perplexity could not be activated by a user saying a "hot word" because, according to Mr. Shevelenko, OEMs lacked the power to set hot words absent Google's blessing. Tr. 719:3-18 (Shevelenko) ("So that's the wake word experience that, you know -- there's nothing, you know, short of kind of Google blessing it that we could get access to that.").

1106. Mr. Shevelenko is incorrect. Multiple Google witnesses testified that the OEM—not Google—has the power to set the hot word(s) for mobile devices. *See* Tr. 353:1-3 (Fitzgerald) ("Q. Could Samsung also use other hot words as an entry point for different GenAI services? A. Yes, it could."); Tr. 3953:25-54:17 (Samat) ("Q. Can Google enable hot words for Google apps, like the Gemini assistant, through Google's design of the Android operating system? A. There's nothing in the Android operating system that gives Google a unique ability to enable a hot word. Google would need to work -- to run a hot word on it -- to make a DSP on a device able to recognize a hot word, Google would need to work with the device maker, just like everyone else.").

1107. In fact, it is entirely possible for an OEM to configure a device to accommodate multiple "hot words," and Samsung has sold devices that include both a "Hey, Bixby" hot word for Samsung's own assistant and a "Hey, Google" hot word. *See* Tr. 3954:18-55:5 (Samat).

1108. Mr. Shevelenko also testified that Perplexity was unable to secure distribution on the home screen of Motorola's devices. Tr. 718:23-19:2 (Shevelenko) ("Did Perplexity try to seek location on the home screen of the device? A. Yes. Q. And what was the result of that effort? A. Unsuccessful.").

1109. The record evidence, however, shows that OEMs—not Google—determine which preloaded GenAI products may be placed on the home screen. *See* Tr. 353:1-6 (Fitzgerald) ("Q.

Could Samsung also use a spot on the -- in the hot seat, for example, or the DHS [i.e., default home screen] as another entry point? A. Absolutely.").

1110. Mr. Shevelenko also testified that changing the default assistant from Gemini to Perplexity was for him a "10, 15-minute affair." Tr. 710:1-8 (Shevelenko) ("Q. How long did it take you? A. You know, after calling the colleague, it was like a 10-, 15-minute affair.").

1111. Mr. Shevelenko's testimony was not credible. The Android OS permits a user to change the default assistant to Perplexity in a matter of seconds via, among other ways, a promotional widget embedded in the Perplexity application. Tr. 741:4-43:22 (Shevelenko) (demonstrating process of changing default assistant); Tr. 3904:17-22 (Samat) ("[Q.] And how long, if we were doing that in real-time, how long would that process of changing the default, if you will, or the invocation of long press power from one provider to another take? A. It takes a few seconds to do."); *see also* RDXD-06.001-.005; RDXD-30.007-.010.

3. The Integration of the Gemini App and Other Google Services Is a Product Design Decision That Increases the Functionality of Google Products.

1112. From the text of the "Self-Preferencing" provision, it is unclear what activity is potentially prohibited. Plaintiffs have stated that that provision "*may*" prohibit the interoperation of Gemini with other Google products and services. *See* RDX0707* at .004-.005 (emphasis added).

1113. The record evidence, however, suggests that the interoperation of the Gemini App on the one hand and Google's other products and services on the other hand facilitates valuable functionality.

1114. Google has begun to incorporate Gemini functionality into Chrome. Tr. 1641:14-16 (Tabriz (Google)). Because Gemini is a transformative capability, its incorporation into the Chrome browser could help consumers as they browse. Tr. 1641:17-23 (Tabriz) ("Q. Would you

also agree Google sees an opportunity for Chrome to deeply integrate with the Gemini app? A. I mean, we're excited about this, because we think it can help people while they're browsing. Gemini is an AI transformative capability. So I don't want to speak on behalf of what a large company is, but for me, I see an opportunity to help people.").

1115. For example, Google has built functionality into the Chrome Omnibox that permits users to submit queries to Gemini—or, if they prefer, another tool like ChatGPT or Perplexity. Tr. 1645:4-8 (Tabriz) ("Q. And if I type @Gemini, I instantly get a Gemini query box that pops into Chrome; correct? A. If you type @Gemini and keep typing, what this will do is open the Gemini web app with additional input that you've provided in the Gemini web app."); Tr. 1646:1-4 (Tabriz) ("Q. I can't set Perplexity or ChatGPT to be a default assistant in Chrome today; correct? A. You can set them to be an assistant that's used in the Omni box. You can do that.").

1116. To take another example, Google has also integrated Lens functionality into Chrome, which allows a user to use an image that appears on his/her screen as a search query. Tr. 1656:25-57:14 (Tabriz).

1117. Likewise, Google's Gemini App interoperates with Gmail, enabling consumers to ask natural-language questions about the emails in their inbox. Tr. 3338:17-25 (Collins) ("THE COURT: I'm sorry. Do you mean to say for example in Gmail now you can name the search bar, not simply just search from whom an email is sent but ask it a natural language question and return emails that answer that question? THE WITNESS: Not from the search bar but from Gemini app you could ask it to summarize your inbox, for example, or to return, you know, if -- ask which email described returning your children's library books on time.").

1118. The Gemini App also interoperates with Google Calendar, providing consumers with a quick and easy way to input numerous events—such as the Washington Nationals games or a child's soccer schedule—into their calendars. Tr. 678:2-80:20 (Hsiao).

1119. No evidence was adduced at the hearing that a prohibition on Gemini interoperating with other Google products and services would benefit competition, and, to the contrary, the evidence shows that designing cross-product functionality is an ordinary commercial practice that can improve the consumer experience. *See* Tr. 1075:13-18 (Schechter) ("Q. And you would agree that Microsoft tries to find ways to let those products and services work together to benefit its users? A. Yes. Where there [are] opportunities to improve the experience by working together, we look to pursue those.").

1120. Many companies—including Microsoft, Perplexity, and Meta—integrate GenAI applications into their products and services with no indication that they permit any functionality that would allow the replacement of their GenAI applications with their rivals'.

1121. For example, Microsoft has integrated Copilot into its Windows operating system. Tr. 1076:14-16 (Schechter) ("Q. It's begun incorporating CoPilot into the Windows operating system; is that right? A. Yes.").

1122. Microsoft has also integrated Copilot into a large number of software applications, including Microsoft Word, PowerPoint, Excel, Loop, Outlook, Teams, Whiteboard, One Note, and Forms. Tr. 1079:5-12 (Schechter); RDX0162 at .004-005.

1123. Microsoft has also integrated Copilot into its Edge browser. Tr. 1076:17-19 (Schechter) ("Q. [Microsoft has] begun incorporating CoPilot into the Edge browser; is that correct? A. Yes.").

1124. Microsoft markets the Edge browser as a superior browser for Copilot experiences compared with Chrome. Tr. 1076:20-25 (Schechter).

1125. Microsoft similarly has integrated Bing into its products and services, including the Windows operating system, the Edge browser, and software applications. Tr. 1075:19-76:10 (Schechter) ("Q. Microsoft, for example, has built Bing functionality into a variety of software products; is that right? A. Yes. Q. What are some examples? A. Microsoft Edge, we have -- we have, for example, autosuggests, a functionality built into that. Windows has a Windows search functionality which is able to use Bing. And something like PowerPoint, you can use Bing to search for images to use in your presentations, things along those lines.").

1126. Perplexity's eponymous chatbot will be integrated into Perplexity's soon-to-be-released Comet browser. Tr. 748:21-49:7 (Shevelenko) ("Q. And I assume the Perplexity answer engine will be integrated into Comet? A. Yes.").

1127. Meta integrates its MetaAI into Facebook and WhatsApp. Tr. 488:6-489:2 (Turley); RDX0355 at .029; RDX0151 at .007; Tr. 4045:22-46:24 (Hitt) ("There are others that are able to get in consumers' hands. Meta, who primarily distributes their GenAI products through their other properties like Instagram and WhatsApp and Facebook has also had success in getting these products into consumers' hands.").

1128. The incorporation of GenAI functionality into other products can improve the user experience. Tr. 1075:8-18 (Schechter) ("Q. And you would agree that Microsoft tries to find ways to let [its] products and services work together to benefit its users? A. Yes. Where there is opportunities to improve the experience by working together, we look to pursue those.").

1129. Integrations like these are common in the software industry and are "very much part of the competitive process." Integrating new "features into a product and increasing the

ability of products to work with one another has been an important part of progress in the software business forever." Tr. 4262:5-63:12 (Murphy (Google Expert)).

1130. And these integrations are value adding, since integrations lower the unit costs of developing new products and encourage development of complementary products. Plaintiffs' self-preferencing provisions interfere with this process and would harm competition, innovation, and consumers across a myriad of rapidly-evolving products and services. Tr. 4262:5-63:12 (Murphy); RDXD-33.032.

VIII. PLAINTIFFS' ADS TRANSPARENCY PROPOSALS WOULD REPLACE COMPETITION WITH REGULATION AND EXPOSE SENSITIVE USER DATA.

A. Plaintiffs' Ads Transparency Proposals Do Not Address General Search Text Ad Competition.

1131. Plaintiffs' search text ads transparency proposals, Pls.' RPFJ §§ VIII.A-D, are regulatory requirements dictating the design of tools and features Google has developed for advertisers, the data contained in reports Google provides to advertisers, and the information about Google's ads auction that Google discloses publicly. Tr. 3263:3-64:5 (Israel (Google Expert)) ("These are just basically regulations, mandates that Google give certain things or design its products in a way that gives advertisers something. . . . It's not a competition remedy. It's mandating an outcome or you could say it is replacing competition with a regulatory mandate.").

1132. None of Plaintiffs' experts opined that the ads transparency proposals would impact competition in the general search services or general search text ads markets. Tr. 4560:14-22 (Jerath (Plaintiff Expert)) ("Q. You are not opining on or expressing any view on whether the proposed Section VIII remedies would enhance competition for queries, correct? A. I'm not offering any views on competition. Q. You are not opining on or expressing any view on

whether the proposed Section VIII remedies would have any impact on competition in the relevant ads market here, general search text advertising, correct? A. No I'm not -- it's correct, basically."); Tr. 2201:16-24 (Chipty (Plaintiff Expert)) ("Q. Section VIII is an entire section dealing with search text ad transparency and reduction of switching costs. . . . [Y]ou have not disclosed any opinions in your expert reports with regards to that provision of plaintiffs' remedy, correct? A. Correct.").

1133. The proposed ads transparency proposals are unnecessary as an economic matter because they are not directed to any anti-competitive conduct identified in the Court's opinion. Tr. 3299:20-300:2 (Israel).

1134. Additionally, the proposed ads transparency remedies are unnecessary as an economic matter because GSEs compete for user queries. When a GSE wins a user query, it also wins the opportunity to show general search text ads in response to that query. Tr. 3191:15-96:1 (Israel) ("[W]hoever wins the user has won the opportunity to sell ads against that query. . . . [W]hat we see in the data and what we've heard throughout the testimony, is that ad dollars follow queries.").

1135. Consequently, advertisers allocate their general search text ad spending in proportion to each GSE's share of user queries. *E.g.*, Tr. 1408:12-22 (Vallez (Skai)) ("From an advertising standpoint, advertisers are going where the eyeballs are."); Liability Tr. 4869:14-70:3 (Lim (JP Morgan)) ("So our budgets mirrors roughly, I think, the market share that those two players have in the paid search space. . . . [W]hich is driven by the search volume that we see in both."); Liability Tr. 5141:19-42:11 (Booth (Home Depot)) ("And I think our investment probably is representative of the amount of searches that are being conducted on the site.").

1136. In determining which options and information to make available to advertisers, Google considers and balances a number of factors and interests, including user privacy, the usefulness of the information to a range of advertisers (including large and small advertisers), the complexity or ease of use for advertisers, the data and information already available to advertisers, and the protection of Google's intellectual property. Tr. 4413:16-14:16, 4446:20-47:23 (Muralidharan (Google)); Tr. 3265:2-66:14, 3275:23-78:8 (Israel).

1137. There is no evidence that any other seller of general search text ads tries to appeal to advertisers by offering any of the data, reporting, options, disclosures, or other information that would be required by the ads transparency proposals. Tr. 3263:3-64:5, 3269:4-70:25 (Israel).

1138. Plaintiffs' ads transparency proposals do not address competition in the general search text ads market; rather, they replace competition with regulation and inflict harm on market participants without competitive benefit. Tr. 3191:15-93:5, 3193:9-96:1, 3263:3-64:5 (Israel).

B. There Is No Evidence That Switching Costs Prevent Advertisers from Moving Ad Spend Between GSEs.

1139. There is no evidence that advertisers face switching costs that inhibit their ability to shift their ad budgets from Google to other sellers of general search text ads. Tr. 3266:22-67:22 (Israel); Tr. 1404:17-05:6 (Vallez); Liability Tr. 5142:14-17 (Booth) ("Q. Looking at a single campaign, how often do you adjust your paid search budget between Google and Bing? A. Daily basis.").

1140. The advertisers that are responsible for the majority of general search text ad spending "[m]ulti-home" across GSEs and therefore easily move spending between them. Tr. 3266:22-67:22 (Israel).

1141. Ad spend on smaller GSEs matches their query share, which indicates that switching costs do not prevent advertisers from moving advertising budgets to smaller providers of general search text ads. Tr. 3266:22-67:22 (Israel) ("[E]veryone has said ad dollars share matches query share. If there were big switching costs you wouldn't see that. You would see the guys with small query share would have an even smaller advertiser share, right, because the advertisers wouldn't be able to switch to them.").

C. Plaintiffs' SQR Proposal (Pls.' RPFJ § VIII.A) Goes Far Beyond the Scope of the Liability Opinion and Harms User Privacy.

1142. The SQR proposal (Pls.' RPFJ § VIII.A) goes far beyond the change to SQRs noted in the liability opinion, which involved only the removal of infrequent queries that do not meet Google's privacy threshold. Liability Op. at 263; Tr. 3267:23-68:15 (Israel).

1143. Google presently provides robust metrics at the keyword level that allow advertisers to optimize their campaigns, including by improving quality and reducing cost. Tr. 4425:21-26:22 (Muralidharan) ("I'm told there are over 90 different reports. . . . In addition to like kind of the obvious performance metrics, like how many ad impressions, clicks, costs, conversions, sort of conversion-type breakdowns, we also give quality score information, for example, like how good was your landing page[.]").

1144. However, the SQR proposal would require Google to provide data at a more granular level—including each individual query leading to each ad "impression"—that does not correspond to what Google has ever provided or to what any other seller of general search text ads provides to advertisers. Tr. 4430:9-25 (Muralidharan); Tr. 3267:23-69:2 (Israel) ("So it's a regulatory mandate for an enormous amount of data that is broader than Google or any other firm that I know of gives today.").

1145. The SQR proposal has no provisions for protecting end-user privacy even though it requires disclosure of individual queries to advertisers, and Plaintiffs presented no evidence regarding how to protect user privacy under Section VIII.A. Tr. 1394:21-95:10 (Vallez); Tr. 4535:20-36:2 (Jerath).

1146. Plaintiffs' privacy expert, Dr. David Evans, was not asked to offer an opinion on Section VIII, but he agrees that disclosing user queries by themselves, even without the other information available to advertisers, raises privacy concerns. Tr. 1185:8-12 (Evans (Plaintiff Expert)) ("I was not asked to opine on Section 8."); Tr. 1188:11-19 (Evans) ("Q. And that's because search queries can, in and of themselves, even if they don't have a direct identifier, be used to re-identify an individual; correct? A. That's true.").

1147. The SQR proposal would restrict Google's ability to compete on user privacy, which is a dimension of competition in the markets identified in the Court's opinion. Tr. 3269:4-70:25 (Israel); Liability Op. FOF ¶¶ 12, 116.

1148. Plaintiffs' proposed requirement that Google provide "any other metric necessary for the advertiser to evaluate its ad performance" would impose a costly burden to resolve ongoing advertiser requests for new metrics, including for sensitive user information. Tr. 3269:4-70:25 (Israel); Tr. 4574:18-75:3, 4576:18-77:7 (Jerath); Tr. 1396:13-98:9 (Vallez).

1149. Plaintiffs' SQR proposal would reduce Google's incentive to innovate, as any new metric that Google develops—potentially including internal proprietary metrics—would need to be made available to all advertisers at the impression level. Tr. 3269:4-70:25 (Israel); Tr. 4434:19-25 (Muralidharan); Tr. 4429:22-30-8 (Muralidharan) ("The one thing on this list we don't provide is the long-term value because that it's a highly internal score.").

D. Plaintiffs' Access to Data Reports Proposal (Pls.' RPFJ § VIII.C) Is Unnecessary, Extends to Ads Outside the Relevant Market, and Fails to Protect Privacy.

1150. Google makes a substantial amount of data and information on search text ads available to advertisers to view and export via the Google Ads front end and Google Ads API, but the data access proposal (Pls.' RPFJ § VIII.C) goes far beyond what Google has ever provided by requiring the real-time export of data "on the most granular and detailed level." Tr. 4425:21-26:13, 4437:6-22 (Muralidharan); Tr. 1368:12-18 (Vallez); Tr. 3272:3-74:2 (Israel).

1151. Google's Ads Data Hub, which would be regulated by RPFJ Section VIII.C, allows advertisers to combine their own data with Google data in a privacy-protecting way. It is specifically designed to give advertisers insights they might find useful without exposing user-identifiable information. Tr. 4435:14-37:5 (Muralidharan); RDX0167 ("Results from ads data hub are aggregated over a group of users which allows Google to provide more complete data and still maintain end-user privacy."); Tr. 1401:23-02:1 (Vallez) ("Q. One of the benefits of aggregating as set forth here is it enhances maintaining end-user privacy, correct? A. That's my understanding, yes.").

1152. Plaintiffs' data access proposal would prevent Google from protecting user privacy by requiring the provision of data from sources, such as Ads Data Hub, "on the most granular and detailed level." Pls.' RPFJ § VIII.C. This would force Google to expose individual user queries, which Plaintiffs' privacy expert acknowledges can be used to identify the user who issued the query even without access to all of the other data available to the advertisers who would receive the queries. Tr. 1188:11-19 (Evans); Tr. 3272:3-74:2 (Israel); Tr. 4437:6-14 (Muralidharan).

1153. Plaintiffs' data access proposal does not address competition with respect to general search text ads and, to the extent any of the information required to be made available

was useful to advertisers, it may lead advertisers to increase advertising spend on Google. Tr. 1406:6-07:7 (Vallez).

1154. The data access proposal would regulate non-search text ads data, including data from display, video, and other forms of advertising. Tr. 4580:14-17 (Jerath); Tr. 3272:3-74:2 (Israel).

E. Plaintiffs' Keyword Matching Proposal (Pls.' RPFJ § VIII.B) Is Unnecessary, Particularly Given Increased Usage of Autobidding.

1155. Plaintiffs' keyword matching proposal, Pls.' RPFJ § VIII.B, would dictate product design rather than allowing it to be determined by the competitive process. Tr. 3274:17-75:22 (Israel).

1156. The pure syntactic keyword matching required by Plaintiffs' RPFJ would create computational difficulties for Google's ads stack by "explod[ing] the number of keywords" that some advertisers submit. It also would not be useful to advertisers and may make Google's search text ads product more difficult for advertisers to use because it is inefficient and burdensome to target each keyword misspelling separately when they all reflect the same user intent. Tr. 4439:22-40:25, 4442:14-43:10 (Muralidharan).

1157. The product design proposed by Plaintiffs' RPFJ also would not be useful today or moving forward because the vast majority of Google's advertisers utilize automated bidding that can automatically adjust the advertiser bid on each user query to account for slight performance differences among keywords with minor variations. Tr. 4418:7-9, 4441:23-42:13 (Muralidharan) ("So the auto bidding system would learn the predicted conversion rate for that and many other dimensions and it would automatically adjust the bids. So as the advertiser, I no longer have to give that detailed instruction because I have this auto bidding agent doing that detailed optimization for me.").

1158. As with Plaintiffs' other ads transparency proposals, there is no evidence that any other seller of general search text ads currently offers the pure syntactic keyword matching option required by Plaintiffs' RPFJ. Tr. 4547:19-48:14 (Jerath).

F. Plaintiffs' Search Text Ad Auction Changes Proposal (Pls.' RPFJ § VIII.D) Imposes Costs, Discloses Google IP, and Is Unnecessary.

1159. In addition to the extensive reporting Google provides to each individual advertiser, Google provides public descriptions of the options available to advertisers to optimize their search text ads campaigns. Tr. 4446:20-47:23 (Muralidharan).

1160. The auction change proposal would require disclosure of thousands of auction changes per year that do not provide meaningful information to advertisers and would be more likely to cause confusion and detract from the information that is already available about how advertisers can achieve their objectives while reducing costs. Tr. 4446:16-47:23 (Muralidharan).

1161. The auction change proposal would require Google to make trade-secret innovations publicly available so that they would be accessible to competitors and to adversarial actors who want to reduce the quality of ads shown on Google.com. Tr. 3275:23-78:8 (Israel); Tr. 4448:25-49:17 (Muralidharan).

1162. The preparation of the reports required by RPFJ Section VIII.D would require considerable time and effort from Google engineers at the expense of innovation. Tr. 4447:24-48:19 (Muralidharan).

1163. Further disclosure would not change the way in which advertisers determine optimal bids, either through experimentation or through the use of autobidding. Tr. 4446:20-47:23 (Muralidharan); Tr. 3275:23-78:8 (Israel); Tr. 1411:1-6 (Vallez) ("If an advertiser is using autobidding or some similar software that automates bidding on keywords, that software will respond to any change in the auction even if the specific change is not publicly disclosed,

correct? A. Correct."), 1411:21-12:5 (Vallez) ("Q. If an advertiser is using experimentation to determine keyword bids, that experimentation will be necessary whether specific changes to the ads auction is known or unknown, correct? A. They do experimentation for a number of different reasons, yes. Q. So they'd still be doing the experimentation, correct? A. Correct.").

IX. PLAINTIFFS' PROPOSED REMEDIES REQUIRING ADDITIONAL NOTICE OF ACQUISITIONS OR INVESTMENTS WOULD HINDER COMPETITION.

1164. Plaintiffs' RPFJ would require Google to provide Plaintiffs with notice, and require a period of delay, before Google could enter into partnerships, collaborations, joint ventures, investments, and acquisitions with any company that controls a Generative AI product. Pls' RPFJ §§ IV.H, I.

1165. These provisions would expressly expand the requirements of the Hart-Scott-Rodino ("HSR") Act beyond existing law for Google only. Tr. 4180:14-81:3 (Hitt).

1166. Plaintiffs did not present testimony from a single witness in support of these proposals. Nor did Plaintiffs offer any evidence that this proposed remedy has any bearing on search engine or search text ads competition.

1167. No Plaintiff in this matter alleged Google engaged in monopoly maintenance by means of its investments or collaborations. Nor have Plaintiffs offered any evidence that Google has made investments in the past that were not covered by the HSR Act and impacted competition in any relevant market in this case.

1168. Google regularly engages in strategic partnerships, collaborations, and investments that both aid its product teams in creating or refining Google products and provide benefits to smaller firms and the GenAI space globally. Tr. 4073:8-74:17 (Hitt).

1169. Some noteworthy examples of these partnerships include Google's acquisition of DeepMind and Google's investment into the AI startup Anthropic. Tr. 4072:15-73:5 (Hitt)

("Google is connected to Anthropic who also does AWS, and also, you know, has been working with Salesforce."); Tr. 4073:8-74:17 (Hitt) ("So DeepMind comes to mind. There, they basically got some of their pre-eminent scientists in deep learning when they founded DeepMind, which then became a key part of their developing their AI capabilities.").

1170. Companies like Anthropic, which build large frontier models, require massive cloud resources to power their LLMs; Google's investment allows Anthropic to compete with companies like Microsoft, OpenAI, and even Google itself. Tr. 2452:18-53:10 (Pichai) ("And Google, in a design and -- from the ground up, our own version of GPU, we call it tensor processing unit, and they are custom designed to their -- their novel way to train machine-learning models. We not only use them internally, all of our Gemini models are trained on TPUs, but we provide them through our Google Cloud platform to other companies, including some of the cutting-edge startups like Anthropic, Safe Superintelligence, SSI, they are all, you know, training on TPUs."); Tr. 4071:22-72:12 (Hitt) ("THE COURT: I'm sorry, when you say deals concerning compute capacity, you mean Google has deals in which they offer cloud computing capacity in exchange for equity in a company or something else? THE WITNESS: I think that's -- some of these arrangements, I had a discussion with the gentleman who focuses on negotiating those, and that was one of the things they contemplated. So we will give you access to Google Cloud to train your models, and we will take a partial stake in some form or have some kind of arrangement. It may be -- it could take on things other than investment, for example, access to your model, or some kind of other relationship. The idea is, yes, there are people -- there are firms that can significantly benefit from getting that capacity, and this is one way in which Google has historically has offered it. We are talking typically about small firms that would be in this box.").

1171. Google further invests in smaller firms, providing those companies with the funding necessary to develop innovative GenAI products and compete in the GenAI market. Tr. 4070:14-71:21 (Hitt) ("It's especially potentially important here when you're talking about, you know, there's many small firms in this space, and we showed some of those big investment numbers, that's, you know, OpenAI will be okay if they didn't have any additional investment from others at the moment. But there are a number of smaller firms that are reliant on early stage investment, particularly those seeking like compute capacity. Google does do a number of deals, investments, to provide firms with compute capacity. And that might be difficult to afford at an early stage for proof of concept.").

1172. These types of agreements are common throughout the tech industry. Tr. 4070:24-71:21 (Hitt) ("So this is an industry that has a lot of collaboration. It's technologically complex. There's a lot of firms that can bring different resources, be it data, be it tech bots, being customer access points, products that could benefit from these things. So collaborations, partnerships, investments in this actively developing space are extremely common. So again, curtailing a common and normal business practice may have implications for the way this market develops.").

1173. Plaintiffs' proposed notice requirement would impose increased cost, time, and uncertainty in pursuing partnerships. Beyond the obvious harm to Google itself, the proposed remedy would harm companies in the fast-moving GenAI space who often need resources or liquidity immediately and could no longer look to Google and instead would be forced to seek a less favorable partnership with another company not subject to the same notice-and-delay provision. Tr. 4070:14-71:21 (Hitt) ("So curtailing these kinds of things reduces -- has the potential to reduce the amount of competition. You will just have fewer of these arrangements,

which decreases the competitiveness of firms that are there and potentially decreases the rate of innovation."); Tr. 4181:4-23 (Hitt) ("But if you were talking about an early-stage firm, say, a small company or even a medium-sized company, you know, I can contemplate the people who would give me investments; one, I have this large notification requirement with an uncertain outcome, I don't know what's going to happen; another I can go do the deal today. You know, I think that sort of takes Google out, which makes the market for that type of investment a little less competitive, and that's the kind of thinking that's in my mind.").

X. THERE IS NO BASIS FOR PLAINTIFFS' PROPOSED REMEDIES REGULATING AGREEMENTS WITH PUBLISHERS.

A. Plaintiffs' Proposal to Regulate Content Agreements with Publishers Ignores Industry Practice and the Pro-Competitive Nature of MFNs Here.

1174. Plaintiffs' RPFJ would prohibit Google from licensing content from a publisher either on an exclusive basis or pursuant to an agreement with a "most favored nation" ("MFN") clause. Pls.' RPFJ § IV.C.

1175. There is no evidence that Google has entered, or is likely to enter, into a content agreement that provides Google with an exclusive license to a specific publisher's content. Tr. 4024:24-27:9 (Hitt (Google Expert)) ("Firms can enter into licensing agreements with third parties to license access to their data for the purposes of AI training . . . . Important thing here is these tend to be nonexclusive . . . . I have not seen, at least in my scan of these documents, any gravitation toward exclusive agreements there."); Tr. 4067:20-70:13 (Hitt) ("[T]here's nothing to suggest this market is moving in a way where these data providers would start reaching exclusive agreements.").

1176. Contrary to Satya Nadella's speculation during the liability phase that "publisher content can get locked in" via "exclusive content deals," Liability Tr. 3512:8-13:9 (Nadella

(Microsoft)), the record reflects no evidence that any company has been precluded from using a publisher's content due to an exclusive agreement.

1177. At his deposition, Microsoft's corporate designee, Vice President Rob Cromwell, was unable to identify any instance in which Microsoft was unable to enter into an agreement with a publisher because the publisher had an exclusive arrangement with one of Microsoft's competitors. *See* Cromwell (Microsoft) (30(b)(6)) Dep. Tr. 21:6-13.

1178. Industry participants, including Google, routinely enter into two types of MFN provisions with publishers: (i) MFNs relating to data quality and (ii) MFNs relating to pricing terms. Tr. 4067:20-70:13 (Hitt); *see also, e.g.*, RDX0410* at .014 ("[redacted]"); RDX0407* at .011 ("[redacted]").

1179. Google includes MFN provisions in its content agreements to ensure the best access to data and content. Tr. 4067:20-70:13 (Hitt) ("So, for example, Google has some data quality-oriented MFNs, things like 'You have to provide us the same timeliness of data as you're providing to others.' I think that's strictly a procompetitive thing. You want consumers to have the best available data in the products they use, so that appears to be procompetitive.").

1180. Google's competitors, including Microsoft and [redacted], similarly include MFN provisions in their data content and licensing agreements. Tr. 4067:20-70:13 (Hitt) ("Second general point is [MFNs are] common, they're common for everybody . . . . [I]t's a common business practice in this space." (testifying about RDXD-32.038)); *see also* [redacted]

(30(b)(6)) Dep. Tr. 62:5-65:25 (discussing [redacted] MFN provision with [redacted]); Cromwell (Microsoft) (30(b)(6)) Dep. Tr. 17:15-18:19, 19:1-9 (discussing the MFN provision in Microsoft's agreement with [redacted]); *see also, e.g.*, RDX0484 ("[redacted] Master Service Agreement"); RDX0501* ("[redacted] Strategic Collaboration Agreement"); RDX0482* ([redacted] "Data License Schedule #2").

1181. MFN provisions do not prevent publishers from entering into agreements with other GenAI companies; in fact, they "make[] it easier to reach agreements." Tr. 4067:20-70:13 (Hitt).

1182. Various publishers have data agreements with both Google and at least one of Google's competitors. Tr. 4067:20-70:13 (Hitt) (testifying about RDXD-32.038). For example, both Google and OpenAI entered into agreements with Reddit, [redacted] and [redacted]. *See* RDX0414* (Google & Reddit "Partner Content Agreement"); RDX0474* (OpenAI & Reddit "Data Use Agreement"); RDX0402* (Google & [redacted] "API & Content License Agreement"); RDX0477* (OpenAI & [redacted] "Master License Agreement"); RDX0416* (Google & [redacted] "Amended and Restated Content Agreement"); RDX0475* (OpenAI & [redacted] "Mutual Cooperation Agreement"). And both Google and Microsoft entered into agreements with [redacted]. *See* RDX0410* ("[redacted] and Google License Agreement"); RDX0468 at .209-.220 ("Microsoft Content Access and Delivery Agreement").

1183. MFN provisions are industry-standard tools that offer benefits to licensors and licensees, and in the circumstances here are pro-competitive. *See* Tr. 4067:20-70:13 (Hitt).

1184. *First*, MFN provisions allow the terms of contracts to adapt to changing circumstances and, in that respect, are particularly useful in rapidly changing industries like the GenAI space. Tr. 4067:20-70:13 (Hitt) ("It makes it easier to reach agreements to say, look, you

know, I don't have to spend a lot of time trying to figure out what the future is going to look like, I can reach agreement today and know I've gotten a good deal tomorrow, when, for example, people discover a new application for this, or I need to be able to build out this capability.").

1185. *Second*, MFN provisions allow parties to reach agreements faster. Tr. 4067:20-70:13 (Hitt) ("You might be able to reach agreements faster.").

1186. *Third*, because of their simplicity and flexibility, MFN provisions allow companies to enter into a larger number of licensing agreements, thus increasing the volume of content available to licensees and increasing compensation for licensors. Tr. 4067:20-4070:13 (Hitt) ("[R]eaching more agreements to get more data used in these things I think is generally a good thing.").

B. Plaintiffs' Publisher Opt-Out Proposal is Unnecessary and Infeasible.

1187. Plaintiffs' RPFJ would obligate Google to "provide online Publishers, websites, and content creators with an easily useable mechanism to selectively opt-out of having the content of their web pages or domains used in search indexing or used to train or fine-tune any of Google's GenAI models or GenAI Products (on a model-by-model basis)." Pls.' RPFJ § VI.B.

1188. Plaintiffs' RPFJ would also obligate Google to "enable online Publishers, websites, and content creators to opt-out of individual GenAI Products on a product-by-product basis without affecting the Publisher, website, or content creator's participation or inclusion in any other Google product or feature." Pls.' RPFJ § VI.B.

1189. Plaintiffs did not present testimony from a single witness in support of these proposals. Nor did Plaintiffs offer any evidence that the publisher opt-out proposal has any bearing on search engine or search text ads competition.

1190. Google currently offers a menu of mechanisms through which publishers can opt out of having their content used in various Google products and services.

1191. *First*, publishers can opt out of Google Search altogether by using the Robots Exclusion Protocol (better known as robots.txt) from crawling on the publisher's site. Tr. 3513:13-14:10 (Reid (Google)) ("Search will use URLs as long as they're permitted by the Google bot user agent in robots.txt.").

1192. *Second*, Google makes available a control called "Google-Extended," which allows publishers to make content available to Google Search while excluding it from being used for the Gemini App, in Google's Cloud product (Vertex AI), or for foundation model training. Tr. 3513:13-3514:10 (Reid) ("[A]nd then we have a Google Extended one, which allows people to say, I'm quite happy for my content to shop in Search, but I don't want it to be used sort of as a behind-the-scenes things in cloud or to be used in the Gemini app."); Tr. 3537:24-38:2 (Reid) ("[Q.] And you mentioned Google Extended. If a publisher enables Google Extended but only does that, do they still appear in Search? A. Yes."); Tr. 3346:24-47:5 (Collins) ("So Google-Extended is a control in robots.txt that allows publishers to opt out of training using . . . their content for training our Generative AI models but still allowing them to be included in Google Search results.").

1193. *Third*, Google gives publishers control over whether (and if so, how long of) a "snippet" can appear on a search results page when a link to the publisher's site is shown. Tr. 3536:6-37:5 (Reid) ("We have no snippet and max snippet that say, you can index this page, you know, you can sort of find it and do this, but I don't want you to show my snippet, or I don't want you to show a snippet longer than a certain length, you know, sort of, I'm only willing to have sort of a smaller preview of the page given.").

1194. The additional requirements that Plaintiffs propose are technologically infeasible. It would be technologically infeasible to permit a "model-by-model" opt-out because there is no

practical way to permit a publisher to opt out of a model that has already been trained. Tr. 3538:7-40:10 (Reid) ("And so you can't say, at the output of a model-by-model basis, Please don't include. What you can say is, you know, if you're building a model starting today, Please don't include my webpage. That's fine. But you can't say, Okay, well, model 2.5, I don't want to be included because the model 2.5 was already built at that point. So that's one challenge.").

1195. The proposed remedy would also require an opt-out for "individual GenAI Products on a product-by-product basis." Plaintiffs' broad definition of a "GenAI Product," includes any "feature" that makes use of GenAI capabilities. Pls' RPFJ § III.K. It is thus infeasible as many of Google's features rely upon the same model, meaning that Google "would essentially have to say, every single feature on the [search] page needs a different model." Tr. 3538:3-40:10 (Reid); *see also id.* ("The -- you tend to build a smaller number of models and then sort of prompt them, give them different instructions to output different features as opposed to build a custom model for each feature.").

1196. Requiring a separate model to be trained and maintained for each feature would be very expensive, would be inefficient, and would make the products and features slower to use. Tr. 3538:3-40:10 (Reid) (testifying that giving each feature its own model would be "very expensive, not just from a TPU use but from sort of, like, good efficiency, latency, other things like that").

1197. Requiring selective opt-out on this basis would also be infeasible for the additional reason that Google would be obligated to provide a new opt-out mechanism and presumably give notice to publishers every time it were to create a new feature. Tr. 3538:3-40:10 (Reid) ("And it also means like you create a new feature tomorrow that uses GenAI. And all of a sudden you need to create a new opt-out and tell all the publishers. And the publisher is

like, Wait, you just created a new feature today; you didn't give me time to opt out. And so it adds sort of enormous complexity.").

1198. Finally, it would also be technologically infeasible for Google to create a product-by-product opt-out "without affecting the Publisher, website, or content creator's participation or inclusion in any other Google product or feature." Pls.' RPFJ § VI.B. Although Google can promise that it would not take punitive action against a publisher for opting out, Google is in no position to rule out the possibility that side effects may result from a user's decision to opt out. Tr. 3540:12-41:14 (Reid) ("You [can't] promise that there isn't a side effect to a different part of the page. It's feasible for us to go say, if you opt out of this part of the -- of GenAI on Search, that we're not going to take any punitive actions on the rest of the page. But users have a whole page. And so if users click on the GenAI part of the page, it will have sort of second order effects on the behavior of the rest of the page.").

XI. COLORADO PLAINTIFFS' PUBLIC EDUCATION FUND IS NOT WARRANTED.

1199. Colorado Plaintiffs (but not United States Plaintiffs) have proposed that Google be required to "fund a nationwide advertising and education program." Pls.' RPFJ § IX.E.

1200. The RPFJ also requires that the Technical Committee "shall assess the role of short-term incentive payments," which Colorado Plaintiffs' expert suggests could require Google to pay users to use Bing or other search rivals. Pls.' RPFJ § IX.E; Tr. 1968:8-23 (Luca (Colorado Expert)).

1201. Neither Colorado Plaintiffs nor Professor Luca were able to identify any antitrust case in which a court has ordered a monetary award to create a public education fund similar to the one proposed. Nor has any court ever ordered an antitrust defendant to pay consumers to use

a rival's services or purchase a rival's products. Tr. 1907:3-08:1 (Luca); RDX0702* at .010-.011 (rejecting "that a remedies proposal here must match a historical antitrust remedy").

1202. Professor Luca pointed to one antitrust case—*United States v. AT&T*, 552 F. Supp. 131 (D.D.C. 1982)—to support the proposal. In that case, the court ordered specific language on joint bills to address consumer confusion. It did not order a monetary award to fund a multi-year public education campaign, and it certainly did not require that AT&T pay users to use rival long distance providers. *AT&T*, 552 F. Supp. at 198-99; Tr. 1906:6-07:2 (Luca).

1203. Neither the RPFJ nor Professor Luca provided any actual language or design for a public education campaign for the Court to consider. Similarly, neither the RPFJ nor Professor Luca provide a proposed level of funding. Pls.' RPFJ § IX.E; Tr. 1981:1-7, 1983:20-24 (Luca).

1204. Instead, the RPFJ envisions that the Technical Committee and the Colorado Plaintiffs will come back to the Court at some later date asking for approval of a specific monetary award based on a specific campaign. Tr. 1914:9-20 (Luca); Pls.' RPFJ § IX.E.

1205. As a result, Colorado Plaintiffs have provided no evidence that a specific monetary incentive or any to-be-constructed public education campaign is warranted. Tr. 1914:4-8 (Luca) (RPFJ does not provide "any specific language or designs so that you could offer an opinion regarding whether that specific information would be helpful to consumers").

1206. Given this lack of evidence, further evidentiary proceedings would need to be conducted after the Technical Committee and Colorado Plaintiffs propose a particular public education campaign.

1207. The Colorado Plaintiffs' proposal would also require numerous hearings throughout the term of Plaintiffs' proposed decree. Professor Luca testified that, to be effective, the Technical Committee and Colorado Plaintiffs would need to first present the Court with a

proposal for funding for "a testing phase," then based on the testing, a proposal for the final design. Any changes to the funding and design, for example based on failure to meet testing metrics, would also need to have a hearing and approval by the court. Tr. 1883:8-85:6 (Luca).

1208. Professor Luca suggested that the Technical Committee may also ask the Court to approve "a separate entity that is controlling an advertising campaign and then launching ads," and the Technical Committee would then compare the advertising to other information dissemination methods to "try to understand how effective they are relative to each other." Tr. 1883:8-85:5 (Luca).

1209. According to Professor Luca, the public education fund would educate consumers on (i) the outcome of the case; (ii) the availability of alternative search engines; and (iii) how to select an alternative. Tr. 1872:16-73:4 (Luca); PXRD013 at 3.

1210. But Plaintiffs have not offered any evidence that the challenged provisions of Google's contracts had any effect on consumer awareness. Tr. 1909:19-22 (Luca).

1211. Plaintiffs similarly have not offered any evidence that brand recognition would have more or less of a barrier to entry absent the challenged provisions of Google's contracts. Tr. 1911:7-11 (Luca).

1212. Although the effectiveness of public education campaigns depends at least in part on the amount of information currently available, Professor Luca did not study or offer any opinion on the amount of information currently available or known to users about these topics. Tr. 1913:11-23, 1915:2-5, 1960:20-25, 1963:6-14 (Luca).

1213. The evidence shows that consumers can easily find the information Colorado Plaintiffs propose a public education campaign would discuss, including through a quick Google Search. Tr. 1915:2-17, 1962:17-22, 1963:25-64:22 (Luca); RDX0175; RDX0176.

1214. Available evidence demonstrates that Google users would not materially switch to rivals if provided additional messaging. The Allcott study found that when Google users were given messaging that they could change their default search engine, what the options were, and how to make that change, only 1.1% of Google users switched to a default other than Google. By contrast, when Bing users were provided this information, 16% switched away from Bing. Tr. 1965:15-68:2 (Luca) (discussing Allcott at 3).

1215. And as to financial incentives, while Allcott found some impact of financial incentives initially, a large number of users quickly switched back to Google, and even more continued to leave Bing for Google through the end of the two-month study. Tr. 4272:2-75:5 (Murphy (Google Expert)) (discussing Allcott Figure 3) ("[Y]ou still have a lot of people who are using Bing who nonetheless later reveal they prefer Google."); RDXD-33.043.

1216. And 44% of users who remained with Bing did so because they forgot to switch back or were too lazy to do so. Tr. 1977:2-79:16 (Luca) (discussing Allcott at 20).

1217. Professor Luca was unable to offer an opinion on what share shift would be expected if the Court adopted a public education campaign. Tr. 1968:3-7 (Luca).

1218. Regardless, to the extent education or direct payments would influence consumers to use search rivals, those rivals have the incentive to fund them. *See* Tr. 1961:1-10, 1965:3-14, 1970:12-71:5 (Luca); Tr. 4272:10-73:5 (Murphy).

1219. Based on the Allcott study, [redacted]

[redacted] PXR0090; *see* Tr. 1971:6-72:16 (Luca).

1220. In addition, the Colorado Plaintiffs' proposal is fundamentally at odds with the positions put forward by the United States Plaintiffs. Dr. Chipty testified that even with Plaintiffs' proposed payment bans, Google would still be able to compete for users, including by providing direct payments to users. Tr. 2159:16-60:9 (Chipty (Plaintiff Expert)); RDXD-14.004.

1221. Professor Luca did not review Dr. Chipty's opinions and did not consider the impact of Colorado Plaintiffs' proposal on those opinions. But if Google were required to pay users to use rivals or to fund marketing for rivals, Google's ability to compete in the ways Dr. Chipty highlights would be greatly diminished. In essence, Google would be funding both sides of the competition, by paying users to switch away from Google as the default and then paying to switch back to Google on a query-by-query basis. *See* Tr. 1970:12-71:5, 1973:11-75:5 (Luca).

1222. Finally, forcing Google to subsidize inferior rivals results in more costs than potential benefits. As shown by the Allcott study, a substantial portion of users would switch back to Google, resulting in only costs without shifting share. And a large portion of the rest would be "stuck" using Bing despite it not being their preferred search engine. That is, there is "a cost associat[ed] with pushing people" to use Bing. Tr. 4273:6-75:5 (Murphy).

XII. PLAINTIFFS' PROPOSED FINAL JUDGMENT VESTS PLAINTIFFS AND THE TECHNICAL COMMITTEE WITH EXCESSIVE DISCRETION AND AUTHORITY.

1223. Plaintiffs' RPFJ does not specify the precise requirements of Plaintiffs' proposals or how they should be implemented. Instead, Plaintiffs ask the Court to create a "Technical Committee" ("TC") to help Plaintiffs make decisions that are critical to the substantive requirements of their proposals.

1224. Tellingly, Plaintiffs' experts repeatedly said they did not know the precise requirements or implementation of Plaintiffs' proposals and instead deferred to the TC on those questions. As a result, their testimony was focused on the impacts of entirely vague proposals that are not defined by the RPFJ. *E.g.*, Tr. 1198:14-99:1 (Evans (Plaintiff Expert)) (privacy); Tr. 1593:7-94:3 (Mickens (Plaintiff Expert)) (divestiture, syndication, and data sharing); Tr. 1914:4-8 (Luca (Colorado Expert)) (public education fund); Tr. 2062:7-63:2 (Locala (Plaintiff Expert)) (scope of Chrome divestiture); Tr. 4574:19-4575:3 (Jerath (Plaintiff Expert)) (advertiser disclosures).

1225. Plaintiffs therefore request that the Court order their proposals without ever explaining what such proposals would fully entail, and instead reserve for Plaintiffs and their proxies on the TC the power to make a host of consequential determinations across nearly every aspect of an RPFJ that does not define the metes and bounds of their authority.

1226. This is different from the role of the Technical Committee in *United States v. Microsoft*, where the Technical Committee was established to assist the plaintiffs with compliance. 231 F.Supp.2d 144, 196 (D.D.C. 2002). Here, the TC has substantive input into what the actual proposals require of Google.

1227. Plaintiffs' proposed process for selecting TC members does not create a neutral body to resolve these issues. Instead, it effectively gives Plaintiffs the ability to select four of the five-member committee. Pls.' RPFJ § X.A.3 ("Plaintiff United States . . . , the Colorado Plaintiff States, and Google will each select one member of the TC, and a majority of those three members will then select the remaining two members."). And Plaintiffs propose that "Plaintiff United States' appointee will serve as chair," the powers of which are undefined. *Id.*

1228. This stands in stark contrast to the Technical Committee in *Microsoft*, where Plaintiffs appointed one member, Microsoft appointed one member, and these two members had to agree upon the third member. *Microsoft*, 231 F. Supp. 2d at 196.

1229. In addition, given the TC's role in determining the precise requirements for and implementation of Plaintiffs' proposals, the *five* members of the TC will need expertise in multiple disparate and non-overlapping disciplines including: (1) mergers and acquisitions; (2) software engineering; (3) information retrieval; (4) artificial intelligence; (5) privacy; (6) advertiser performance; (7) public education campaigns; (8) behavioral science; (9) economics; (10) regulatory investigations; and more. *See infra* ¶¶ 1231-58. But the criteria for selecting TC members do not address all of these subjects. Pls.' RPFJ § X.A.2.

1230. And given that Google can appoint only *one* member, it will not be represented across these subjects. For instance, if Google chooses a privacy expert on the committee (based on its commitment to protect its users), it will have no representation on important questions related to divestiture, artificial intelligence, information retrieval, economics, and more.

1231. ***Divestiture (§ V).*** The RPFJ reserves to Plaintiffs, in consultation with the TC, key decisions on the precise requirements and implementation of the Plaintiffs' proposal to divest Chrome and conditionally divest Android.

1232. The RPFJ states that the TC will "inform" Plaintiffs regarding the definition of "Chrome" for the purposes of divestiture. *See* Pls.' RPFJ § III.F ("'Chrome' . . . includ[es] . . . all code, software, applications, APIs, and other products and services provided by Google that are critical, as informed by the views of the Technical Committee, to the full and proper functioning of Chromium or the Chrome browser."). What exactly that entails is unknown.

1233. Mr. Locala agreed the TC will determine "part of" the "scope of what's Chrome," that is, what is being actually offered for sale. Tr. 2055:2-23 (Locala). And, according to Mr. Locala, if prospective buyers come back and ask for additional assets, the TC "would have to help *adjudicate* that." Tr. 2062:7-63:2 (Locala) (emphasis added).

1234. As a result, Mr. Locala testified that he did not know which "features and functionality will be carried through into a divested form of Chrome," Tr. 2043:8-11 (Locala), or even "what the divestiture process for Chrome is going to be," Tr. 2054:8-12 (Locala).

1235. The RPFJ also reserves to Plaintiffs the ability to evaluate and approve a potential buyer of Chrome, using unbounded criteria such as, in their "sole discretion" "any potential risks to national security" and "any other issues a potential buyer may present." Pls.' RPFJ § V.A.

1236. The RPFJ states that the TC will also "inform" Plaintiffs regarding the definition of "Android" for the purposes of divestiture. *See* Pls.' RPFJ § III.B ("'Android' . . . includ[es] . . . all code, software, applications, APIs, and other products and services provided by Google that are critical, as informed by the views of the Technical Committee, to the full and proper functioning of an Android device[,] . . . the Google Play Store[,] and Google Play Services.").

1237. Plaintiffs have also reserved for the TC the power to investigate whether Android divestiture should be triggered by allegations that Google "attempt[ed] to or is successful in circumventing" the proposed self-preferencing provisions of the RPFJ. Pls.' RPFJ § V.C. The standards for any such investigation are not provided in the RPFJ, and Plaintiffs were unwilling in discovery to "answer what standards another body, like a future to-be-created Technical Committee, would use to evaluate whether Google ha[s] violated any portion of the Court's ultimate Final Judgment." RDX0705* at .017; *see* Pls.' RPFJ § III.C.

1238. ***Data Sharing and Search Syndication (§§ VI & VII).*** The RPFJ reserves to Plaintiffs, in consultation with the TC, key decisions related to the precise requirements and implementation of the Plaintiffs' proposed disclosures of data and syndication of search and search ads. *See generally* Pls.' RPFJ §§ VI, VII.

1239. The RPFJ reserves to the Plaintiffs the decision of which of Google's rivals or potential rivals will receive data and syndication. *See* Pls.' RPFJ § III.U ("Qualified Competitor" means one "who meets the *Plaintiffs' approved data security standards* as recommended by the Technical Committee and . . . who *makes a sufficient showing to the Plaintiffs*, in consultation with the Technical Committee, of a plan to invest and compete in the GSE and/or Search Text Ads markets[.]" (emphases added)).

1240. The RPFJ reserves to the TC the decision of which signals in Google's index, beyond those enumerated, must be provided to Qualified Competitors. *See* Pls.' RPFJ § VI.A (search index data includes "any other specified signal the TC recommends to be treated as significant to the ranking of search results").

1241. The RPFJ reserves to Plaintiffs, in consultation with the TC, the decision regarding the frequency with which Google's search index and "user side data" must be provided to Qualified Competitors. *See* Pls.' RPFJ §§ VI.A, C.

1242. The RPFJ reserves to the TC the decision of which of Google's query rewriting features, beyond those enumerated, must be syndicated. *See* Pls.' RPFJ § VII.A (syndicated results include "any other important query rewriting features identified by the TC").

1243. The RPFJ reserves to Plaintiffs, in consultation with the TC, the decision of when and to what extent syndication will be phased out over the ten-year period. Pls.' RPFJ § VII.C ("scope of allowable syndication will be determined by Plaintiffs in consultation with the TC").

1244. And the RPFJ reserves to Plaintiffs, in consultation with the TC, the decision of the maximum number of allowable "synthetic queries." Pls.' RPFJ § VII.E.

1245. The RPFJ reserves to Plaintiffs, in consultation with the TC, the process for how data will be shared with Google's rivals. *See* Pls.' RPFJ §§ VI.D ("Plaintiffs, in consultation with the TC, [will] determine [whether] the technology [for sharing user-side data], including security and privacy safeguards, is fully functional"), VI.F (same for ads data); *see also* Tr. 1174:1-77:3 (Evans) (TC "is not a one-time thing. It's a standing committee.").

1246. The RPFJ reserves to the TC the decision of which data security safeguards to recommend, and to the Plaintiffs the ability to approve those safeguards. *See* Pls.' RPFJ § X.A.7.b ("The TC will have the power to recommend reasonable data security standards applicable to Qualified Competitors, which will be approved by the Plaintiffs.").

1247. Plaintiffs' data privacy expert, Dr. David Evans, agreed that he could not propose any specific safeguards for Google or its users in order to "protect the data that was requested to be shared in the proposed remedy while providing adequate utility." Tr. 1200:20-01:15 (Evans).

1248. Instead, Dr. Evans testified that the TC should balance the tradeoff between data utility and privacy, or the risk of sensitive information disclosure. *See* Tr. 1170:2-71:7 (Evans) ("I think these are the kind of issues that could get complicated but that a technical committee would be well positioned to weigh and understand.").

1249. Dr. Evans's deferral to the TC is contrary to Plaintiffs' assurances to the Court that Plaintiffs would provide the metes and bounds of privacy protections through "an expert that talks about privacy and the proper guardrails that can and can't happen." Jan. 17, 2025 Status Conference Hr'g Tr. 92:14-24 (Trent (DOJ)).

1250. ***Search Ads Transparency (§ VIII).*** In connection with Plaintiffs' search ads transparency proposals, the RPFJ requires Google to provide advertisers a search query report that includes "any other metric necessary for the advertiser to evaluate its ad performance." Pls.' RPFJ § VIII.A. Plaintiffs have stated that they "expect that advertisers would make those metrics known to Google" and that "it is the Technical Committee that would, in the first instance" evaluate what metrics Google must provide (including sensitive metrics like user location or user emails). RDX0705* at .024; Tr. 4574:19-4575:3 (Jerath).

1251. In addition, the RPFJ requires that Google provide monthly public disclosures of "changes made to Google's Search Text Ads auctions," with Plaintiffs granting themselves "the right to challenge any disclosure they deem inadequate." It is not defined who has the power to resolve such challenges. Pls.' RPFJ § VIII.D.

1252. ***Choice Screens (§ IX).*** The RPFJ reserves to Plaintiffs, in consultation with the TC, key decisions related to the precise requirements and implementation of the Plaintiffs' choice screen proposals.

1253. Under the RPFJ, "the TC will report to Plaintiffs whether each Choice Screen satisfies these requirements, and ultimately Plaintiffs must approve any Choice Screen offered pursuant to this Final Judgment." Pls.' RPFJ § IX.D.

1254. In addition, "Plaintiffs, in consultation with the TC, may require modifications to any Choice Screen over time." Pls.' RPFJ § IX.D. The RPFJ does not specify or limit what these modifications could entail. *See* Pls.' RPFJ § IX.D.

1255. ***Public Education Fund (§ IX.E).*** The RPFJ reserves to Colorado Plaintiffs, in consultation with the TC, key decisions related to the precise requirements and implementation of the Colorado Plaintiffs' Public Education Fund (the "PEF").

1256. Colorado Plaintiffs did not provide any specific language or designs of what would be provided to consumers as part of their proposal. Instead, the RPFJ reserves to the TC the design of the PEF, "for the approval of the Colorado Plaintiff States and subsequent review of this Court." Pls.' RPFJ § IX.E; *see also* Tr. 1900:17-01:10, 1913:24-14:12 (Luca).

1257. The RPFJ reserves to the TC recommending the funding level of the PEF, "for the approval of the Colorado Plaintiff States and subsequent review of this Court." Pls.' RPFJ § IX.E; Tr. 1980:21-81:7, 1983:20-24 (Luca). Professor Luca agreed that there is nothing in the RPFJ that caps the level of funding that the TC may recommend. Tr. 1982:18-23 (Luca).

1258. The TC also would assess "the role of short-term incentive payments in achieving the goals of the Public Education Fund." Pls.' RPFJ § IX.E. And Professor Luca does not have an opinion on the appropriateness of short-term incentive payments. Tr. 1983:20-24 (Luca).

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Respectfully submitted,

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