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PALO ALTO RESEARCH CENTER INC.

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

Palo Alto Research Center Inc., Plaintiff, v. Facebook, Inc., Defendant.	Case No. 2:20-cv-10753 **COMPLAINT FOR PATENT INFRINGEMENT** **DEMAND FOR JURY TRIAL**

Plaintiff Palo Alto Research Center Inc. ("PARC" or "Plaintiff") brings this Complaint against Facebook, Inc. ("Facebook" or "Defendant") for infringement of U.S. Patent Nos. 8,489,599 (the "'599 Patent"); 9,208,439 (the "'439 Patent"); 9,137,190 (the "'190 Patent"); 8,732,584 (the "'584 Patent"); 7,043,475 (the "'475 Patent"); and 8,606,781 (the "'781 Patent"); and 7,167,871 (the "'871 Patent") (collectively, the "PARC Patents"). Plaintiff, on personal knowledge as to its own acts, and on information and belief as to all others based on its investigation, alleges as follows:

SUMMARY OF THE ACTION

1. This is a patent infringement suit relating to Facebook's unauthorized and unlicensed use of the PARC Patents on its websites and in its apps. The technologies claimed in the PARC Patents support many of Facebook's core functionalities, such as its personalized and targeted advertisement services; and its News Feed, notifications, and groups features.

2. PARC has been at the forefront of technological innovation for over 50 years. In addition to inventing the first personal computer, PARC is responsible for many cutting-edge technologies we now consider indispensable to our daily lives, like the laser printer; Ethernet; the windows, pop-up menus, and icons that form today's computer "desktop"; a word processing program that led to Microsoft Word; and computer animation systems that later earned both an Emmy and an Academy Award. PARC's revered scientists and engineers are integral to its history of innovation and work tirelessly, all over the world, to continue creating transformational products for the future. In recognition of that hard work, the United States Patent and Trademark Office ("USPTO") has issued thousands of patents to PARC.

3. Facebook, by contrast, is a relatively young social media company. Although Facebook started out as a small Harvard student directory, it has become a clearinghouse of information for billions of users all over the world. This exponential

growth created a host of unanticipated issues for Facebook, including how to serve targeted, relevant advertisements to users when there are millions of ads and advertisers from which to choose, and relevancy and integrity of users' News Feed.

4. Because PARC was at the nucleus of the idea that later birthed the Internet, it anticipated many of these issues before they ever became a problem for Facebook. And PARC's ground-breaking artificial intelligence—which has been a focus of PARC engineers since well before Facebook existed—forms the backbone of many of these solutions, including those described in the PARC Patents. PARC brings this action to put a stop to Facebook's unauthorized and unlicensed use of the PARC Patents.

THE PARTIES

I. PARC

5. PARC is a wholly-owned subsidiary of Xerox Corporation ("Xerox"), with a principal place of business at 3333 Coyote Hill Road, Palo Alto, California 94304.

6. PARC and its corporate parent, Xerox, have made some of the most important technological breakthroughs of the past 100 years, including the first personal computer; the advent of laser printing, Ethernet, and graphical user interfaces ("GUIs"); the "desktop" metaphor ubiquitous with today's computers; object-oriented programming; electronic paper; and many other technologies. Not only do PARC and Xerox have a deeply-rooted past in pioneering printer and computer advancements, but they have also extended that legacy to newer technologies like artificial intelligence ("AI").[1] AI underlies the machine learning, computer modeling, and data

[1] *See* Greg Nichols, *PARC is turning 50: From Ethernet and laser printing to this wild new tech*, NDNET, (March 10, 2020), https://www.zdnet.com/article/parc-is-turning-50-from-ethernet-and-laser-printing-to-this-wild-new-tech/.

science tools that will help businesses solve the challenges of the 21st century related to big data, personalization, and prediction algorithms.

7. PARC's innovations aren't limited to its computing origins. PARC develops and builds technologies far beyond its core competencies, and helps others bring their ideas to fruition. For example, PARC has worked with the U.S. Department of Defense, Department of Energy, NASA, and DARPA to meet their ambitious goals for the next generation of technology. PARC also partners with entrepreneurs and start-ups to realize their dreams. These collaborations have resulted in greener air conditioning technologies,[2] floating oceanic sensors, fiber optic sensors, solar energy, natural language search, novel medical devices, and improvements to natural gas processing. Today, PARC continues this tradition to shape the future and improve the world.

II. DEFENDANT

8. On information and belief, Facebook is a Delaware Corporation with its principal place of business at 1601 Willow Road, Menlo Park, California 94025. Facebook is a social media company, which owns and operates Facebook, Instagram, WhatsApp, and other social media services.

9. On information and belief, Facebook (including its subsidiaries) directly and/or indirectly develops, designs, manufactures, uses, distributes, markets, offers to sell and/or sells infringing products and services in the United States, including in this District, and otherwise purposefully directs infringing activities to this District in connection with its websites and applications.

[2] *See Electrocaloric devices show potential for greener air conditioning*. PhysicsWorld (Oct. 1, 2020), https://physicsworld.com/a/electrocaloric-devices-show-potential-for-greener-air-conditioning/.

JURISDICTION AND VENUE

10. This is an action arising under the patent laws of the United States, 35 U.S.C. §§ 1, *et seq*. Accordingly, this Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 (federal question) and 1338(a) (action arising under an Act of Congress relating to patents). Venue is proper in this judicial district under 28 U.S.C. §§ 1391 and 1400(b).

11. More specifically, this action for patent infringement involves Facebook's manufacture, use, sale and/or lease, offer for sale and/or lease, of infringing technology within its websites and various applications to create and deliver targeted and personalized ads; deliver personalized, context-specific content to users; identify false or misleading information; and maintain the relevancy and integrity of its News Feed (the "Infringing Products" associated with each of the PARC Patents as shown below).

12. The Infringing Products, which are explained in exemplary detail *infra*, include Facebook's targeted and personalized advertising systems; Facebook's notifications and messaging systems; Facebook's comment organization systems; and Facebook's systems that identify false or misleading information.

13. On information and belief, Facebook has two offices physically located in the Central District of California. One office is located at 12777 W. Jefferson Blvd., Los Angeles, CA 90066,[3] and the second is located at 8500 Balboa Blvd., Los Angeles, CA 91325.[4] Facebook lists these offices on its website.[5] On information and

[3] *See Facebook LA*, GOOGLE MAPS, https://goo.gl/maps/tUNHDqUMaoNHJeoz7 (last visited November 24, 2020).

[4] *See Facebook Connectivity Lab @ Northridge,* GOOGLE MAPS, https://goo.gl/maps/5Sh3jSuSjXbcGy2U6 (last visited November 24, 2020).

[5] *See e.g. Careers*, FACEBOOK,

belief, Facebook owns and/or leases the premises where these offices are located. On information and belief, these Facebook offices are staffed by persons directly employed by Facebook, many of whom live in this District. On information and belief, Facebook employs numerous individuals whom live in and/or work within this District. In addition, in 2019, Facebook signed a lease for property located at 12105 and 12126 W. Waterfront Drive in preparation to move from its current 35,000 square foot space to an even larger office.[6]

14. On information and belief, Facebook has committed and continues to commit acts of infringement in violation of 35 U.S.C. § 271, and has made, used, marketed, distributed, offered for sale, sold, and/or imported its Infringing Products in the state of California, including in this District, and engaged in infringing conduct within and directed at or from this District.

15. On information and belief, Facebook conducts its regular, established business at these locations in this District. These Facebook offices and employees develop, provide, maintain, make available, and assist others in using the Infringing Products, including customers in this District, across the United States, and across the globe. Facebook has also purposefully and voluntarily placed the Infringing Products into the stream of commerce with the expectation that the Infringing Products will be used in this District. The Infringing Products have been and continue to be distributed to and used in this District. Facebook's acts cause injury to PARC, including within this District.

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https://www.facebook.com/careers/locations/?job_region=North%20America (last visited November 24, 2020).

[6] *See, e.g.* Mediha DiMartino, *Facebook: Dialing in Partnerships and Ramping Up Technology*, LOS ANGELES BUSINESS JOURNAL (NOV. 8, 2019) https://labusinessjournal.com/news/2019/nov/08/facebook/.

16. This Court has general and/or specific personal jurisdiction over Facebook, and venue is proper because Facebook, directly and/or in combination with its subsidiaries and/or through its agents, does continuous and systematic business in this District, including by providing its Infringing Products to residents of this District, providing its Infringing Products that it knew would be used within this District, and/or participating in the solicitation of business from residents of this District.

17. Moreover, on information and belief, Facebook, directly or through its subsidiaries, places its Infringing Products in the stream of commerce, which is directed at this District, with the knowledge and/or understanding that such Infringing Products will be provided to customers within this District. In addition, on information and belief, Facebook, directly or through its subsidiaries, employs individuals within this District, including employees who design, develop, use, offer, or make available its Infringing Products to customers here, and maintains offices and facilities here. Facebook, directly or through its subsidiaries, operates highly-trafficked commercial websites and mobile applications through which customers in this District regularly use the Infringing Products.

18. Venue is appropriate in this Court because PARC maintains business connections in this District. PARC has partnered with various organizations to create innovations that have had significant impact on this District. For instance, in collaboration with the Virginia Tech Transport Institute (VTTI), PARC secured funding from the Advanced Research Projects Agency–Energy (ARPA-e) section of the United States Government's TRANSNET program in order to create a pilot program in Los Angeles designed to save substantial amounts of energy previously used on commercial transportation.[7] Other examples include PARC's work with the

[7] Press Release, PARC A Xerox Company, *PARC Secures ARPA-E Funding to Build*

University of California, Riverside ("UCR"), on (a) a DARPA project related to a UCR AI visual security project;[8] and (b) a Department of Energy project related to the production of carbon fibers. Yet another example is PARC's work with Boeing's HRL Laboratories in Malibu related to diode research.

FACTUAL BACKGROUND

I. PARC'S HISTORY OF INNOVATION

19. PARC has spent more than 50 years investing in and developing ground-breaking technology. From revolutionary laser printer and Ethernet innovations to transformational AI, PARC and Xerox have been at the forefront of every major technological advancement in the computer world.

20. In 1970, PARC was born. PARC was originally tasked with creating computer-related products, and it delivered. In 1971, PARC created laser printers, which developed into a multibillion dollar printing business for Xerox. In 1973, PARC designed the first personal computer called the "Alto" and a system of linked devices, which it coined "Ethernet." In 1975, PARC debuted the first GUIs, and eventually influenced both Microsoft and Apple in their first attempts at personal computing. As a result, PARC has earned the moniker of "the smartest think tank on the planet."[9]

Energy-Saving Travel Preferences Attractive to Individual Travelers, PARC, https://www.parc.com/press-releases/parc-secures-arpa-e-funding-to-build-energy-saving-travel-preferences-attractive-to-individual-travelers/ (last visited November 24, 2020).

[8] UC Riverside News, *UC Riverside computer scientists receive grant to improve security of visual artificial intelligence*, https://news.ucr.edu/articles/2020/07/27/uc-riverside-computer-scientists-receive-grant-improve-security-visual (last visited November 24, 2020).

[9] *See* Nicole C. Wong, *Xerox PARC's legacy continues on,* East Bay Times, (Jan. 8, 2007). https://www.eastbaytimes.com/2007/01/08/xerox-parcs-legacy-continues-on-

21. PARC continues to create innovative products today, and helps others pioneer the future of science and technology. It lends custom research and development services, technology, expertise, and best practices to several Fortune 500 and Global 1000 companies, small startups, and numerous government agencies. These partnerships have resulted in game-changing solutions to electric grid reliability,[10] climate change, infrastructure maintenance, and other industries.[11] PARC's efforts have created $1 trillion in new industries, generated more than $60 billion in start-ups and spin-offs, and resulted in over 6,000 patents.

II. FACEBOOK HAS LONG BENEFITED FROM ITS USE OF PARC'S PATENTED TECHNOLOGIES

22. Facebook generates substantially all of its revenue from selling advertising. As early as 2009, when Facebook had 350 million monthly users, Mark Zuckerberg noted that ad revenue was a crucial part of Facebook's business model. These revenues allow Facebook to provide a "free" social network to users, maintain and expand its infrastructure, pay its bills, and turn an immense profit.[12]

23. Facebook's monthly views—many of which relate to the Facebook's infringement as outlined in this Complaint—have increased eight times over since

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3/.

[10] Press Release, PARC A Xerox Company, The U.S. Department of Energy's Office of Electricity (OE) Selects PARC, Con Edison, and GE to Improve Grid Reliability (July 29, 2019) https://parc.com/press-releases/the-u-s-department-of-energys-office-of-electricity-oe-selects-parc-con-edison-and-ge-to-improve-grid-reliability/.

[11] *See Xerox Provides MaaS Services in LA and Denver*, Drive Sweden, (June 7, 2016) https://www.drivesweden.net/en/xerox-provides-maas-services-la-and-denver.

[12] Rishi Iyengar, *Here's how big Facebook's Ad Business Really Is*. CNN BUSINESS, (July 1, 2020) https://www.cnn.com/2020/06/30/tech/facebook-ad-business-boycott/index.html.

2009, and its subsidiaries garner even more views. In 2020, Facebook has almost 3 billion monthly active users.[13] Almost 2 billion people log onto Facebook daily.

24. Facebook ad revenues are up 22% in 2020. In the first three quarters of 2020, 8 million advertisers have promoted their content on Facebook. In 2019, Facebook generated $69.7 billion from advertising, more than 98% of its total revenue for the year.[14]

25. Between generating its largest source of income, and being the solution to one of its most prevalent criticisms in the past few years, Facebook's unauthorized and unlicensed use of the PARC Patents has substantially contributed to Facebook's financial success.

FIRST CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 8,489,599

26. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-25 of this Complaint.

27. The '599 Patent is valid and enforceable under United States Patent Laws.

28. PARC owns, by assignment, all right, title, and interest in and to the '599 Patent, including the right to collect for past damages.

29. A copy of the '599 Patent is attached as Exhibit A.

The '599 Patent

30. The '599 Patent describes, among other things, a method and apparatus for creating and presenting content based on contextual information. In one embodiment, the '599 Patent describes receiving and using contextual information

[13] *Id.*

[14] *Id.*

about a user to determine a context associated with the user. The '599 Patent further describes using this context to determine if a trigger condition is met, and, if so, presenting content to a user. The '599 Patent also describes that the user's response may be monitored, and an action may be taken depending on the user's response.

31. By 2008, PARC recognized that although there was a proliferation of mobile devices (including phones, PDA, and laptops), "these mobile devices are not capable of learning and understanding the behavior of their users." '599 Patent at 1:19-22, 1:41-43. Indeed, as the '599 Patent notes:

> these mobile devices cannot determine when and how best to provide their users with information or suitable entertainment content, because they do not take into account the activities that their users are involved in.

Id. at 1:43-46.

32. To address these issues, in one embodiment, the '599 Patent "provide[s] a content management system for organizing and delivering packages of audio and visual content to a user in response to activities being performed by the user, and in response to a number of environmental factors associated with the user." *Id.* at 3:51-55.

33. The invention of the '599 Patent works, for example, by "receiv[ing] a set of contextual information with respect to the user, and processes the contextual information to determine a context which is associated with an activity being performed by the user." *Id.* at Abstract.

34. This contextual information can come "from a number of input sources (*e.g.*, a global positioning system (GPS) device, or an accelerometer), which reflects basic information associated with the user." *Id.*at 4:33-36; *see also id.* at 4:36-46, 6:23-7:2. The '599 Patent describes that the preferred system embodiment can "determine a context associated with a user and/or operating conditions of the mobile device based on contextual information." *Id.* at 7:30-33; *see also id.* at 7:33-45. The

system "can be programmed to infer specific contexts about the user based on contextual information." *Id.* at 7:46-48; *see also id.* at 7:48-59.

35. One embodiment of the '599 Patent further describes that if the user's context or activity "satisfy a trigger condition," the system "selects content from a content database ... to present to the user." *Id.* at Abstract. These triggers can be pre-defined, including in relation to specific content. *Id.* at 3:60-4:6. Different content can be presented in different contexts. *Id.* at 8:39-50.

36. The '599 Patent's "FIG. 3 presents a flow chart illustrating a process for delivering context-based content to a user in accordance with an embodiment of the present invention[]":

> The content management system begins by receiving contextual information (operation 310), and processing the contextual information to determine a context (operation 320). Next, the content management system determines whether the context satisfies a trigger condition (operation 330). If so, the content management system selects content from the content database based on the context (operation 340), and presents the selected content to the user (operation 350).

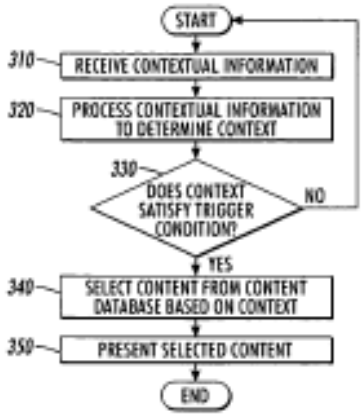


FIG. 3

Id. at 18:53-63, Fig. 3.

37. Depending on "an expected response from the user," an embodiment of the '599 Patent "can perform an action responsive to a user response or interaction with the presentation of content." *Id.* at 12:50-51, 12:66-13:1.

'599 Patent Allegations

38. Facebook designed, implemented, and currently uses a variety of advertising tools, including "Audiences," to target ads for its social media platform. *See* https://www.facebook.com/business/help/717368264947302?id=176276233019487. "Detailed targeting is a targeting option available in the 'Audience' section of ad set creation that allows you to refine the group of people we show your ads to. You can do this with information such as additional demographics, interests and behaviors." *See* https://www.facebook.com/business/help/182371508761821?id=176276233019487. Facebook provides "options available for creating a new audience," including location (such as country, region, or city) and device type. https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (explaining Facebook's location targeting options); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining that Facebook's detailed targeting may consider device type).

39. On information and belief after reasonable investigation, Facebook's targeted advertising tools ("'599 Infringing Products") infringe the '599 Patent. Facebook operates a method for delivering context-based content to a first user. For instance, Facebook offers detailed targeting to target ads to users based on user location, or whether the user is on a mobile device or a desktop. *See, e.g.*, https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining Facebook's detailed targeting options); *see also*

https://www.facebook.com/business/help/282701548912119?id=649869995454285 (describing ad creation flow).

40. Facebook receives at least one content package, wherein the content package includes at least one content piece and a set of rules associated with the content package, wherein the set of rules includes a trigger condition and an expected response, and wherein the trigger condition specifies a context that triggers a presentation of the content piece. For instance, Facebook receives ad campaigns containing ads and targets for ads. Facebook ad targets include location and device conditions such as a user's location or a user's type of device (including mobile versus desktop) that trigger presenting an ad to the user as well as whether the user is expected to see, click, view, or otherwise interact with the ad. *See, e.g.*, https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (describing Facebook's location targeting options); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (describing Facebook's detailed targeting options); https://www.facebook.com/business/help/282701548912119?id=649869995454285 (describing ad creation flow); https://www.facebook.com/business/help/146070805942156?helpref=faq_content (explaining how Facebook charges for advertising events).

41. Facebook receives a set of contextual information with respect to the first user, processes the contextual information to determine a current context for the first user, determines whether the current context satisfies the trigger condition, and, in response to the trigger condition being satisfied, presents the content piece to the first user. For instance, Facebook receives information about its users, including information about each user's location (whether through GPS, IP address, or other information) and type of device. Facebook processes that information to determine the

user's location and device type. Facebook serves and presents ads to the user after determining that the user accessed Facebook, for instance, with the required device type or from the required location. *See, e.g.*, https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (describing Facebook's location targeting options);https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining Facebook's detailed targeting options); https://www.facebook.com/privacy/explanation (describing the type of device data Facebook collects).

42. Facebook receives a response from the first user corresponding to the presented content piece, and determines whether the received response matches the expected response. For instance, Facebook tracks the user's clicks, views, and other responses to the presented ad, and determines whether the user's response is what the advertiser will pay for. As one example, Facebook's advertising platform allows advertisers to choose whether to be charged when someone clicks an ad link or watches a certain percentage of a video. *See, e.g.*, https://www.facebook.com/business/help/146070805942156?helpref=faq_content (explaining how Facebook charges advertisers).

43. Facebook performs an action based on an outcome of the determination. For instance, Facebook charges an advertiser if the user clicks, views, or otherwise responds to the presented ad, and further improves its targeting by tracking user responses to ads and modifying its practice such that an ad's relevance score is changed. The more positive interactions with an ad, the higher the ad's relevance score, and vice versa. Further, Facebook logs user responses to advertisements, such as clicks, views, or other responses, so that the ad creator can monitor the performance of ad campaigns, ad sets or individual ads. *See, e.g.*, https://www.facebook.com/business/help/146070805942156?helpref=faq_content

(explaining how Facebook charges advertisers); https://www.facebook.com/business/news/relevance-score (describing how relevance scores are calculated); https://www.facebook.com/business/help/318580098318734?id=369013183583436 (describing how a user who runs an advertisement can view the results).

44. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1, 12, and 19 of the '599 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '599 Infringing Products.

45. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '599 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '599 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1, 12, and 19 of the '599 Patent, literally and/or under the doctrine of equivalents.

46. This Complaint will serve as notice to Facebook of the '599 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

47. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '599 Patent.

48. Facebook provides the '599 Infringing Products and instructions to its users such that they will use the '599 Infringing Products in a directly infringing manner. Facebook markets the '599 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '599 Patent on its website and elsewhere. *See, e.g.*, https://www.facebook.com/business/help/717368264947302?id=176276233019487;

https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852; https://www.facebook.com/business/help/282701548912119?id=649869995454285; https://www.facebook.com/business/help/146070805942156?helpref=faq_content; https://www.facebook.com/business/news/relevance-score.

49. Facebook users directly infringe by using the '599 Infringing Products in their intended manner. Facebook induces such infringement by providing the '599 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '599 Patent or has taken deliberate actions to avoid learning of infringement.

50. Additional allegations regarding Facebook's knowledge of the '599 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

51. Facebook's infringement of the '599 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

52. Facebook's infringement of the '599 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

53. PARC has been damaged by Facebook's infringement of the '599 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

54. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '599 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

SECOND CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 9,208,439

55. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-54 of this Complaint.

56. The '439 Patent is valid and enforceable under United States Patent Laws.

57. PARC owns, by assignment, all right, title, and interest in and to the '439 Patent, including the right to collect for past damages.

58. A copy of the '439 Patent is attached as Exhibit B.

The '439 Patent

59. The '439 Patent describes, among other things, a method and system for collecting mobile device contextual information and updating recommendation systems for activities or items of interest to a user. In one embodiment, the '439 Patent describes receiving mobile device data collected through detectors related to the device's surroundings. The '439 Patent further describes using that data to modify a context graph that stores information about a device user's behavior. The '439 Patent also describes sending a notification when certain changes to the context graph are made.

60. By 2013, PARC recognized that although "mobile devices equipped with technology to detect physical surroundings [had] become more pervasive in our everyday lives," using this additional information was difficult as it "takes considerable time and expense to develop such context-aware systems." '439 Patent at 1:14-33. The '439 Patent therefore sought to "solve the problem of efficiently developing context aware systems by providing a generic contextual intelligence platform that may be adapted for specific applications." *Id.* at 2:49-52. "Such a contextual intelligence system facilitates real-time processing of contextual

information and support[s] contextual application development for Web and mobile applications." *Id.* at 2:53-55.

61. To achieve its goals, the '439 Patent "provides a system for providing user information to a recommender." *Id.* at Abstract. In one embodiment, the '439 Patent system "receives, from a mobile device, event data derived from contextual data collected using detectors that detect the mobile device's physical surroundings" *Id.* The system then "modifies [a] context graph based on the event data" and "determines that the modification to the context graph matches [a] registration, and sends a notification of context graph change to [a] recommender." *Id.*

62. In one '439 Patent embodiment, "[c]ontextual data describes a computing context detected by a mobile device client, such as physical surroundings and/or application and/or operating system context." *Id.* at 2:60-62. "The client-side architecture collects contextual data by detecting a computing context including physical surroundings, application, and operating system context." *Id.* at 3:1-3. This collection may be done "using detectors such as a GPS, an accelerometer, and/or a compass." *Id.* at 3:49-51; *see also id.* at 4:31-40. The client-side may determine high-level events (*e.g.*, "a user reading email") and low-level events (*e.g.*, walking, button push, screen capture) based on information collected from the device. *Id.* at 3:4-22. The client can then "transmit both high-level events and low-level events to the server via an event posting interface 302 and/or a RESTful WebAPI." *Id.* at 5:42-44. "The server-side architecture stores the contextual data and uses the contextual data to modify a graph containing user behavior and interest information." *Id.* at 2:62-65.

63. In one embodiment, the '439 Patent describes that "[t]he context graph includes information about user behavior and/or user interests." *Id.* at 1:41-43. "The context graph stores generic user model information that may be adapted for application-specific user models...." *Id.* at 5:32-34. One exemplary context graph "is a per-user, in-memory, graph-based model that stores facts and assertions about user

behavior and actions. Context graph 406 is a database of information about the user." *Id.* at 7:28-31. This context graph can be used, for instance, by "recommenders [to] modify implementation-specific user models based on the data received from the context graph, and make recommendations based on the information-specific user models." *Id.* at 6:67-7:4.

64. As one example, the '439 Patent describes that "the system may notify recommenders of context graph changes." *Id.* at 7:55-56. This context graph information, and changes to the graph, can be used by recommenders to "generate and/or modify recommendations." *Id.* at 8:6-11.

'439 Patent Allegations

65. Facebook designed, implemented, and currently uses a variety of advertising tools, such as "Audiences," to target ads for its social media platform. *See* https://www.facebook.com/business/help/717368264947302?id=176276233019487. "Detailed targeting is a targeting option available in the 'Audience' section of ad set creation that allows you to refine the group of people we show your ads to. You can do this with information such as additional demographics, interests and behaviors." *See* https://www.facebook.com/business/help/182371508761821?id=176276233019487. Facebook provides "options available for creating a new audience," including location. https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (explaining Facebook's location targeting options).

66. On information and belief after reasonable investigation, Facebook's targeted advertising tools ("'439 Infringing Products") infringe the '439 Patent. Facebook receives, from a mobile device, event data derived from contextual data collected using detectors that detect a physical context surrounding the mobile device.

For instance, Facebook receives device data and data collected using GPS, WiFi, and other location-tracking devices within the user's mobile phone. From that data, Facebook derives the user's location and device type, among other things. *See, e.g.*, https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (explaining Facebook's location targeting options); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining Facebook's detailed targeting options); https://www.facebook.com/help/278928889350358 (explaining Location Services and how it provides Facebook with users' locations); https://www.facebook.com/privacy/explanation (describing the type of device data Facebook collects).

67. Facebook modifies a context graph that stores facts and assertions about a user's behavior and interests using the event data. For instance, Facebook uses recent/current device type and location data (along with other information) to modify and update the Facebook Graph over time. This Graph stores facts and assertions about the user's behavior and interests, including location history, Open Graph tags, likes, friends, tags, interest lists (such as interests from a user's timeline, liked pages, and keywords), events, social context, behaviors (such as digital activities, devices people use, past or intended purchases, and travel), and more. *See, e.g.*, https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (explaining Facebook's location targeting options); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining Facebook's detailed targeting options); https://developers.facebook.com/docs/marketing-api/audiences/reference/basic-targeting/ (describing that basic or core targeting includes demographics and events,

location, interests, and behaviors); https://www.facebook.com/help/278928889350358 (explaining Location Services and how it provides Facebook with users' locations); https://www.facebook.com/privacy/explanation (describing the type of device data Facebook collects); https://research.fb.com/wp-content/uploads/2013/08/unicorn-a-system-for-searching-the-social-graph.pdf (describing how the Facebook graph indexes and accesses data);

68. Facebook, in response to determining that there exists a registration for notification of changes that matches the modification to the context graph, sends a notification of context graph change to a recommender. For instance, Facebook advertisers may elect to be notified of changes to the Facebook Graph via the store traffic objective and store traffic ad campaigns. Facebook sends notifications of the changes to the advertiser by serving advertisements or customizing ad content when event data, such as user location and device type, processed into the Facebook Graph, indicates the user is within a location or contains a device type for which an advertisement has been targeted for delivery. *See, e.g.*, https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852 (explaining Facebook's location targeting options); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining Facebook's detailed targeting options); https://www.facebook.com/business/help/956093091134327 (explaining Facebook's store traffic objective).

69. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1, 7, and 13 of the '439 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United

States, and/or importing into the United States without authority or license, the '439 Infringing Products.

70. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '439 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '439 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1, 7, and 13 of the '439 Patent, literally and/or under the doctrine of equivalents.

71. This Complaint will serve as notice to Facebook of the '439 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

72. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '439 Patent.

73. Facebook provides the '439 Infringing Products and instructions to its users such that they will use the '439 Infringing Products in a directly infringing manner. Facebook markets the '439 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '439 Patent on its website and elsewhere. *See, e.g.*, https://www.facebook.com/business/help/717368264947302?id=176276233019487; https://www.facebook.com/business/help/202297959811696?id=176276233019487&recommended_by=797315877335852; https://research.fb.com/wp-content/uploads/2013/08/unicorn-a-system-for-searching-the-social-graph.pdf; https://www.facebook.com/help/278928889350358; https://www.facebook.com/business/help/956093091134327.

74. Facebook users directly infringe by using the '439 Infringing Products in their intended manner. Facebook induces such infringement by providing the '439 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in

infringement of the '439 Patent or has taken deliberate actions to avoid learning of infringement.

75. Additional allegations regarding Facebook's knowledge of the '439 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

76. Facebook's infringement of the '439 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

77. Facebook's infringement of the '439 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

78. PARC has been damaged by Facebook's infringement of the '439 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

79. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '439 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

THIRD CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 9,137,190

80. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-79 of this Complaint.

81. The '190 Patent is valid and enforceable under United States Patent Laws.

82. PARC owns, by assignment, all right, title, and interest in and to the '190 Patent, including the right to collect for past damages.

83. A copy of the '190 Patent is attached as Exhibit C.

The '190 Patent

84. The '190 Patent describes, among other things, a system and method for content-based message distribution. More specifically, the patented invention relates to a system and method for utilizing tags to distribute content to a select group of recipients.

85. By 2010, PARC recognized the drawbacks of the electronic messaging systems that existed at the time:

> Current electronic messaging systems offer keyword searches to identify electronic messages. However, keyword searches are limited since the keyword must be included in the content of an electronic message and users often have no control over the content if they are recipients of the electronic message.

'190 Patent at 1:31-36.

86. PARC also recognized the drawbacks of content tagging as it existed at the time:

> Content tagging systems are available to organize electronic information gathered by users using tags. The tags are assigned to a piece of electronic info and can describe a topic or content of the info, which allows users to easily find the tagged information through a tag search….However, use of the current tagging systems can be impractical and burdensome due to the need to incorporate a separate system into a user's daily routine. For example, each user client must be installed with the tagging system and registered with the appropriate server. …. Also, the tagging systems fail to generate and maintain associations between tags, electronic information, and users.

Id. at 1:43-56.

87. In response to these drawbacks, PARC invented "a system and method for unobtrusively integrating content tagging and distribution with existing communication structures and services." *Id.* at 1:65-67. PARC's patented invention provides a means of seamlessly incorporating the tagging and distribution of data into one's daily practice. *Id.* at 2:58-60.

88. The '190 Patent relates to a system whereby "[a]n incoming message with a recipient address and a tag address including at least one content tag associated with one or more users is received." *Id.* at 2:10-12. The tag addresses can include a structure for defining the content tag, and the content tag may be selected by the user. *Id.* at 3:12-17. Topics and keywords are examples of potential content tags. *See id.* at 3:18-20. Each content tag is associated with one or more users. *Id.* at 10:51-52. In one embodiment, the system identifies the content tag within the tag address and the recipient associated with the recipient address. *Id.* at 2:12-14. The recipient is then added to the content tag as one of the users and an "incoming message is displayed to at least one of the users associated with the content tag." *Id.*at 2:14-17.

89. The '190 Patent system, in one embodiment, then displays an incoming message to at least one of the users associated with the at least one content tag. *Id.* at 10:58-59; *see also id.* at 3:62-64 ("Once the tag address is processed, the email message can be directly transmitted to one or more users associated with the tag and identified via the user-to-tag association record."); *id.* at 4:4:8 (noting that messages can be distributed based in "triggers such as event feeds, subscriptions, and triggers from other data sources, including web resources and internal or external data repositories."). Finally, the system may deliver to the recipient an additional message that consists of a notification that the recipient has been added to the at least one content tag. *Id.* at 10:60-65. In one embodiment, the additional message includes a removal button, and the recipient is removed from the at least one content tag upon activating the removal button. *Id.* at 4:18-31. In one embodiment, the steps of this

exemplary method are performed by a suitably-programmed computer. *Id.* at 10:66-67.

'190 Patent Allegations

90. Facebook designed, implemented, and currently uses notification tools to distribute and display certain content for its users. Once a user "follows" a particular Facebook page or joins a group, Facebook adds that user to the set of users who receive notifications about that particular group or page. *See* https://www.facebook.com/help/276458109035418/ (describing how a user can follow a particular page or join a group); https://www.facebook.com/help/1210322209008185/ (describing how a user can choose the notifications that they want to receive for a Facebook group that the user has joined). Facebook then distributes "notifications" to the set of users to alert them of any new post or comment that has been added to their Facebook group(s) or page(s). *See id.*; https://www.facebook.com/help/333140160100643/ (describing how to create a post on Facebook). A user can then clink on the notification to read the newly-added post or comment.

91. On information and belief after a reasonable investigation, Facebook's notification tools ("'190 Infringing Products") infringe the '190 Patent. Facebook operates a method of content-based message distribution. For instance, Facebook sends a user notification(s) about posts in a group to which the user belongs or regarding a page that the user follows. *See, e.g.*, https://www.facebook.com/help/1210322209008185/ (describing how a user can choose the notifications that they want to receive for a Facebook group that the user is a member of); https://www.facebook.com/help/299284303519326 (describing how a user can turn notifications on or off for people or pages that the user follows).

92. Facebook receives an incoming message with a recipient address and a tag address comprising one or more content tags, each of the content tags associated

with one or more users. For instance, Facebook receives a new post, with one or more tagged users, and one or more pages or groups who created the post or are tagged in the post. *See, e.g.*, https://m.facebook.com/facebookapp/ (an example of a Facebook group that includes aspects such as recipient addresses and content tags). Each of the content tags are associated with one or more user, such as the group of users who follow a specific page or group. *See, e.g., id.;* https://www.facebook.com/help/727473118066542 (discussing how to see users associated with a content tag).

93. Facebook identifies at least one of the content tags within the tag address and a recipient associated with the recipient address. For instance, Facebook associates the substance of the post with one or more individual user accounts and/or one or more pages or groups. *See, e.g.*, https://www.facebook.com/help/333140160100643/ (describing how to create a post on Facebook).

94. Facebook adds the recipient to the at least one content tag as one of the users. For instance, Facebook adds a user who "follows" a particular page or group to the set of users who follow that page or group. *See, e.g.*, https://m.facebook.com/facebookapp/ (identifying the users that follow a particular Facebook group). Similarly, Facebook adds a user who joins a group as one of its members. *See, e.g.*, https://www.facebook.com/help/103763583048280 (explaining how to join a Facebook group).

95. Facebook displays the incoming message to at least one of the users associated with the at least one content tag. For instance, Facebook displays the incoming message to users that click on the notification of new posts or comments sent to users associated with the content tag such as a group name. *See, e.g.*, https://www.facebook.com/help/299284303519326?helpref=popular_topics (describing how to turn notification on or off for people of pages that a user follows).

96. Facebook delivers to the recipient an additional message comprising a notification that the recipient has been added to the at least one content tag, wherein the additional message further comprises a removal button and the recipient is removed from the at least one content tag upon activating the removal button. For instance, Facebook notifies a user through a message box, email, or other manner (such as the when the user clicks the "Follow" button on a page or the secondary box on a notification). The Facebook notification includes a removal button, such as an "Unfollow this Page" or other option to turn off notifications. If the user selects the "Unfollow this Page" or other option to turn off notifications, he/she is removed from the at least one content tag. *See, e.g.*, https://www.facebook.com/help/190078864497547/?ref=u2u (describing how a user can "unfollow" a content tag); https://www.facebook.com/help/299284303519326 (describing how a user can turn notifications on or off for people or pages that the user follows).

97. Facebook performs the prior steps using a suitably-programmed computer. For instance, Facebook uses programs that run on one or more computers, such as servers or server clusters. *See, e.g.*, https://engineering.fb.com/data-center-engineering/facebook-s-new-front-end-server-design-delivers-on-performance-without-sucking-up-power/ (describing Facebook's front-end server design).

98. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1 and 9 of the '190 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '190 Infringing Products.

99. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '190 Patent under 35 U.S.C. § 271(b). On information and

belief, one or more of the '190 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1 and 9 of the '190 Patent, literally and/or under the doctrine of equivalents.

100. This Complaint will serve as notice to Facebook of the '190 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

101. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '190 Patent.

102. Facebook provides the '190 Infringing Products and instructions to its users such that they will use the '190 Infringing Products in a directly infringing manner. Facebook markets the '190 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '190 Patent on its website and elsewhere. *See, e.g.*, https://www.facebook.com/help/276458109035418/; https://www.facebook.com/help/1210322209008185/; https://www.facebook.com/help/727473118066542; https://www.facebook.com/help/333140160100643/; https://www.facebook.com/help/299284303519326?helpref=popular_topics; https://www.facebook.com/help/190078864497547/?ref=u2u; https://engineering.fb.com/data-center-engineering/facebook-s-new-front-end-server-design-delivers-on-performance-without-sucking-up-power/.

103. Facebook users directly infringe by using the '190 Infringing Products in their intended manner. Facebook induces such infringement by providing the '190 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '190 Patent or has taken deliberate actions to avoid learning of infringement.

104. Additional allegations regarding Facebook's knowledge of the '190 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

105. Facebook's infringement of the '190 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

106. Additional allegations regarding Facebook's knowledge of the '190 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

107. Facebook's infringement of the '190 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

108. PARC has been damaged by Facebook's infringement of the '190 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

109. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '190 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

FOURTH CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 8,732,584

110. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-109 of this Complaint.

111. The '584 Patent is valid and enforceable under United States Patent Laws.

112. PARC owns, by assignment, all right, title, and interest in and to the '584 Patent, including the right to collect for past damages.

113. A copy of the ’584 Patent is attached as Exhibit D.

The ’584 Patent

114. The ’584 Patent describes, among other things, a system and method for generating an information stream summary using a display metric. More specifically, the ’584 Patent describes the ability to adjust the on-screen size and density of content based on a calculated social relevance. In one embodiment, the ’584 Patent system displays summaries of information in display windows whose size is based on relevance to the user. For example, more relevant information is displayed in a bigger window, while less relevant information is displayed in a smaller window.

115. By 2010, PARC recognized the drawbacks of receiving large amounts of information electronically:

> Information overload is a growing concern as the amount of information sources available and received electronically, for example, through the Internet has exponentially grown. People face the challenge of keeping track or numerous streams of information from a variety of sources, such as email messages from work colleagues and friends, news stories, status updates from networking sites, and changes to shared electronic files, such as documents in content management systems.

’584 Patent at 1:13-21.

116. PARC also recognized related problems specific to social networking sites as the existed at that time:

> As the popularity of social networking sites increases, the number of messages transmitted daily also increases. For example, the number of tweets transmitted per hour via Facebook has already risen well above two million. Due to the number of messages transmitted, users are having difficulty reviewing all of the messages received. Sorting through and

> reviewing received messages can be very time consuming, even after a short period of time away. …
>
> Additionally, some information sources, such as the Facebook News Feed, provide a subset of information to the user based on recommendation filters to alleviate some of the information overload. However, the subset dynamically updates and when a user click[s] through a particular piece of information in the subset to get further details and then clicks back into the subset, the information stream has updated and the valuable information can be lost downstream.

Id. at 1:24-31, 1:51-58.

117. As a result, PARC recognized "a need for management of information streams that include[d] providing a high level summary of the information in the stream and highlighting the potentially most important information while retaining user control." *Id.* at 1:59-62. PARC ultimately addressed this need by developing the invention claimed in the '584 Patent.

118. The '584 Patent relates to a system and method "for generating an information stream summary using a display metric." *Id.* at Abstract. In one embodiment, the '584 Patent system receives an information stream comprising a plurality of information stream items. *Id.* at 10:50-51. Information stream items can be "created by users or automatically generated, and can include items such as emails, news contents, status updates from networking sites, such as Facebook and Facebook, and notifications of changes to electronic files[.]" *Id.* at 3:6-10.

119. Next, in one embodiment of the '584 Patent, the system calculates a display metric for each of the plurality of information stream items as an indication of relevance of one such information stream item to a user. *Id.* at 10:52-62; *see also id.* at 3:35-51. The calculation measures the social attention given to that information stream item from other users relative to at least one of the remaining information stream

items. *Id.* The social attention is determined based on a relative degree of interest by the user in content of the information stream items by assigning a ranking to each of the information stream items based on a previous interest shown by the other users to information stream items similar to the content. *Id*. A social attention metric, for example, may "utilize[] the overall social attention given an information stream item [ ] relative to the other information stream items [ ] by users of the information stream." *Id.* at 4:46-61. The social attention metric can come from "the entire collection of users of the information stream or a subset, such as a particular user's friends or followed users." *Id.* at 4:50-54.

120. Next, the '584 Patent groups the plurality of information stream items into one or more summary objects and assigns a display size to each of the one or more summary objects. *Id.* at 10:63-64. The display size of a summary object is relative to the aggregated calculated display metric. *Id.* at 10:65-67. Finally, the system then displays the one or more summary objects based on the assigned size. *Id.* at 11:4-5; *see also id.* at 6:41-7:14, 8:26-39.

'584 Patent Allegations

121. Facebook designed, implemented, and currently uses a variety of relevancy tools, such as the "Most Relevant" comment feature, to determine which comments to display to a user. For example, Facebook prioritizes the display of comments that are from a user's friends or that have the most likes or replies. *See* https://www.facebook.com/help/539680519386145 (discussing the "Most Relevant" comment feature).

122. On information and belief after a reasonable investigation, Facebook's relevancy tools ("'584 Infringing Products") infringe the '584 Patent. Facebook performs a computer-implemented method for generating an information stream summary using a display metric. For instance, Facebook relies on servers or server clusters to generate the content stream of comments on Facebook page posts. *See, e.g.*,

https://engineering.fb.com/2016/03/09/data-center-engineering/facebook-s-new-front-end-server-design-delivers-on-performance-without-sucking-up-power/ (discussing Facebook's front-end server design); https://www.facebook.com/help/539680519386145 (discussing the meaning of the "Most Relevant" label that appears above some comments on a Facebook post).

123. Facebook receives an information stream comprising a plurality of information stream items. For instance, Facebook receives a plurality of comments from users posted on a plurality of Facebook page posts. *See, e.g.*, https://www.facebook.com/help/499181503442334 (discussing how a user can comment on a Facebook post).

124. Facebook calculates a display metric for each of the plurality of information stream items as an indication of relevance of one such information stream item to a user by measuring social attention given to that information stream item from other users relative to at least one of the remaining information stream items, wherein the social attention is determined based on a relative degree of interest by the user in content of the information stream items by assigning a ranking to each of the information stream items based on a previous interest shown by the other users to information stream items similar to the content. For instance, Facebook calculates a relevance metric of one comment relative to other comments on a Facebook page post based on the social attention the post has received, including whether the user that posted the comment is a friend, whether the comment was posted by a verified page, and whether the comment has a high number of likes and replies. *See, e.g.*, https://www.facebook.com/help/539680519386145 (discussing the meaning of the "Most Relevant" label that appears above some comments on a Facebook post).

125. Facebook groups the plurality of information stream items into one or more summary objects. For instance, Facebook groups a plurality of related comments together. *See, e.g.*,

https://www.facebook.com/help/187302991320347?helpref=search&sr=7&query=comment%20tracking&search_session_id=1a5fce02354bdeb5bcd7a36e9aa2909a (describing how to comment on a post); https://www.facebook.com/help/187302991320347?helpref=search&sr=7&query=comment%20tracking&search_session_id=1a5fce02354bdeb5bcd7a36e9aa2909a (describing how to respond to another user's comment).

126. Facebook assigns a display size to each of the one or more summary objects based on an aggregate of the calculated display metric of each of the information stream items within that summary object, wherein the display size of that summary object is relative to the aggregated calculated display metric. For instance, the below image shows that Facebook has sized the comment groupings based on the Most Relevant feature.

https://m.facebook.com/facebookapp/.

127. Facebook displays the one or more summary objects based on the assigned size. For instance, as shown above, Facebook displays the one or more groupings of comments and/or links to more comments to the user underneath a Page Post. The size of the displayed comment/link groupings relates to the size assigned through the Most Relevant feature. Facebook has infringed and is infringing,

individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1 and 10 of the '584 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '584 Infringing Products.

128. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '584 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '584 Infringing Products directly and/or indirectly infringe (by induced infringement) at least claims 1 and 10 of the '584 Patent, literally and/or under the doctrine of equivalents.

129. This Complaint will serve as notice to Facebook of the '584 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

130. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '584 Patent.

131. Facebook provides the '584 Infringing Products and instructions to its users such that they will use the '584 Infringing Products in a directly infringing manner. Facebook markets the '584 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '584 Patent on its website and elsewhere. *See, e.g.*, https://engineering.fb.com/2016/03/09/data-center-engineering/facebook-s-new-front-end-server-design-delivers-on-performance-without-sucking-up-power/; https://www.facebook.com/help/539680519386145; https://www.facebook.com/help/499181503442334; https://www.facebook.com/help/187302991320347?helpref=search&sr=7&query=comment%20tracking&search_session_id=1a5fce02354bdeb5bcd7a36e9aa2909a.

132. Facebook users directly infringe by using the '584 Infringing Products in their intended manner. Facebook induces such infringement by providing the '584

Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '584 Patent or has taken deliberate actions to avoid learning of infringement.

133. Additional allegations regarding Facebook's knowledge of the '584 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

134. Facebook's infringement of the '584 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

135. Additional allegations regarding Facebook's knowledge of the '584 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

136. Facebook's infringement of the '584 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

137. PARC has been damaged by Facebook's infringement of the '584 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

138. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '584 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

FIFTH CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 7,043,475

139. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-138 of this Complaint.

140. The ’475 Patent is valid and enforceable under United States Patent Laws.

141. PARC owns, by assignment, all right, title, and interest in and to the ’475 Patent, including the right to collect for past damages.

142. A copy of the ’475 Patent is attached as Exhibit E.

The ’475 Patent

143. The ’475 Patent describes, among other things, a method and system for clustering user sessions using “multi-modal information” and “proximal information.” In one embodiment, the ’475 Patent invention begins by selecting a number of user paths in a collection of content portions. It then determines both multi-modal and proximal information for content portions associated with each user path. The ’475 Patent combines the multi-modal and proximal information to form a user profile, and clusters multi-modal and proximal information of user profiles based on similarity. In other words, the ’475 Patent uses certain data associated with a user’s path when traversing web pages in order to create a user profile. The information is then clustered based on similarity. As a result, the ’475 Patent can tailor information delivery to users.

144. By 2002, PARC recognized that “the World Wide Web has become the information repository of choice for both corporations and individual users.” ’475 Patent at 1:22-23. As the ’475 Patent notes, information about how “users travers[e] their document collections or web sites” can be “used to tailor the delivery of information.” *Id.* at 1:29-32. Although certain existing products could trace a user’s path through the Internet like a map, they could not consider “the multiple modes of information...available” to create user types and thus deliver tailored information. *Id.* at 1:53-54.

145. The '475 Patent solves this problem through "devices, systems and methods for clustering user sessions using multi-modal information and proximal information." *Id.* at 1:58-60.

146. In one '475 Patent embodiment, "a plurality of user paths are selected in a collection of content portions." *Id.* at 1:61-62. Each user path is generated as "the user traverses the [web] site" from one web page to another. *Id.* at 5:37-43. "[T]he content portions 110, 120 and 130 may be web pages in the Internet," and "[e]ach content portion 110, 120 and 130 contains one or more contents that may be of interest to a user." *Id.* at 3:17-20.

147. The '475 Patent further describes that, in one embodiment, "for each path," both multi-modal and proximal information "for content portions associated with the user path [are] determined." *Id.* at 1:62-67. Multi-modal information may "include the content feature vector, the uniform resource locator feature vector, the inlink feature vector and the outlink feature vector for the content portion." *Id.* at 4:63-5:1. A "content feature vector reflects the content of the words contained by each document or web page in the path" *Id.* at 8:60-62. Proximal information may be determined, for example, from text associated with a link. *Id.* at 15:43-46. "Proximal terms represent information cues that convey information," and "may include portions of the text 202 surrounding the link 204" or "cue words from the text surrounding the image link." *Id.* at 4:16-21, 4:45-46.

148. The '475 Patent also describes that "the multi-modal information for content portions and the proximal information for content portions associated with the user path are combined to form a user profile." *Id.* at 2:1-4. For example, "[t]he multi modal vector allows different types of information representing the document collection to be combined and operated upon using a unified representation." *Id.* at 6:20-23. Feature vectors and proximate cues can be "concatenated to form a single multi-modal vector that represents the content portion" or "the feature vectors and the

proximal cue vectors having the selected measure of similarity with the cluster center vectors based on the feature vector and the proximal cue vector similarity function are averaged." *Id.* at 5:3-6, 10:11-14.

149. The '475 Patent further describes that "the multi-modal information and proximal information of user profiles are clustered based on similarity." *Id.* at 2:4-6. As the '475 Patent notes, "any or all of bases for determining similarity between the proximal cue feature vector, the content feature vector, the uniform resource locator feature vector, the inlink feature vector, the outlink feature vector and the information need feature vector may be changed. As discussed above, any technique for selecting a similarity function may be used." *Id.* at 13:21-26.

'475 Patent Allegations

150. Facebook designed, implemented, and currently uses a variety of advertising tools, such as "Audiences," to target ads for its social media platform. *See* https://www.facebook.com/business/help/717368264947302?id=176276233019487. "Detailed targeting is a targeting option available in the 'Audience' section of ad set creation that allows you to refine the group of people we show your ads to. You can do this with information such as additional demographics, interests and behaviors." *See* https://www.facebook.com/business/help/182371508761821?id=176276233019487. "Facebook will automatically show your ads to people who are most likely to find your ads relevant. You can further target your ad delivery with three audience selection tools," including "Core Audiences," "Custom Audiences," and "Lookalike Audiences." https://www.facebook.com/business/ads/ad-targeting. Facebook touts its ability to reach users most likely to make purchases. https://www.facebook.com/help/794535777607370#lookalike.

151. On information and belief after reasonable investigation, Facebook's targeted advertising tools ("'475 Infringing Products") infringe the '475 Patent.

Facebook clusters user sessions using multi-modal information and proximal information. For instance, Facebook creates audiences for targeted advertising using links that users click and information located near the links or within the links. *See, e.g.*, https://www.facebook.com/business/help/182371508761821?id=176276233019487 (explaining that advertising that employs "[d]etailed targeting ... allows you to refine the group of people we show your ads to [based on] ... additional demographics, interests and behaviors."); https://www.facebook.com/business/ads/ad-targeting (explaining the "Core Audiences," "Custom Audiences," and "Lookalike Audiences" Advertising tools); https://www.facebook.com/ds/preferences/?entry_product=ad_settings_screen (showing "Advertisers and Businesses" for "Whose website, app or store you've interacted with" and "Whose ads you've clicked").

152. Facebook selects a plurality of user paths in a collection of content portions. For instance, Facebook selects user paths that the users take through Facebook's content, including which posts users "Like," "Comment" on, or "Share," information from ads every user has ever seen or clicked on, and pages they engage with. *See, e.g.*, https://research.fb.com/wp-content/uploads/2017/12/hpca-2018-facebook.pdf (describing machine-learning used by Facebook, which includes likes, comments, and shares).

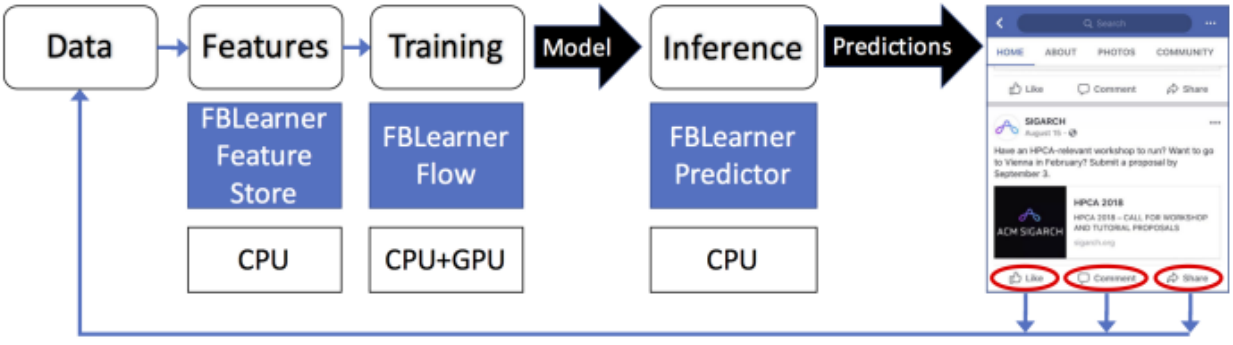


Fig. 1. Example of Facebook's Machine Learning Flow and Infrastructure.

Id.;
https://www.facebook.com/business/help/1823715087618 21?id=176276233019487 (describing detailed targeting in Facebook's advertising products); https://www.facebook.com/business/help/2135725323234735 (describing Facebook's Ads Manager); https://www.facebook.com/privacy/explanation (describing how Facebook collects and retains information from users); https://www.facebook.com/help/1701730696756992 (describing information that Facebook collects on every user).

153. For each user path, Facebook determines multi-modal information for content portions associated with the user path. For instance, Facebook tracks what hyperlinks users click, including links embedded in call-to-action buttons or embedded in advertisement content. In addition, Facebook determines and stores data of all advertisers for which a user has clicked on at least one ad. Further, Facebook tracks "advertisement attributes" including keywords that best predict whether a user will click on an ad. *See, e.g.*, https://research.fb.com/wp-content/uploads/2017/12/hpca-2018-facebook.pdf (describing advertising attributes considered in Facebook's advertising system); https://dl.acm.org/doi/10.1145/2648584.2648589 (describing that hundreds of attributes are considered in Facebook's advertising system); https://www.facebook.com/adpreferences/advertisers/?section=clicked_advertisers (showing any user of Facebook a history of advertisers on which they have clicked); .

154. For each user path, Facebook determines proximal information for content portions associated with the user path. For instance, Facebook advertisements present users with call-to-action buttons that have textual information associated with the button, located directly on the button and/or beside the button, to provide motivation to a user to take a specified action by clicking the button. In addition, the URL hyperlinked by the call-to-action button may contain tracking information that

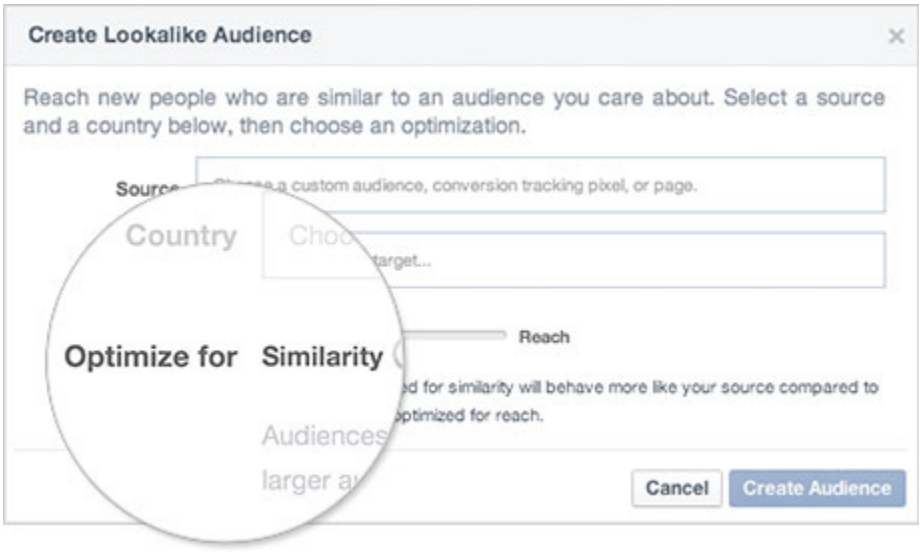
could be interpreted by a Facebook Pixel on the subsequently visited site, such as the Facebook Click Identifier, Advertising Campaign, and/or Experiment Type. *See, e.g.*, https://developers.facebook.com/docs/marketing-api/conversions-api/parameters/fbp-and-fbc/ (describing how Facebook Click Identifiers are tracked by Facebook Pixel outside of the Facebook site or app); https://www.facebook.com/help/1701730696756992 (describing that ads clicked by a user is stored by Facebook); https://www.facebook.com/dyi (location for users to download the history of advertisements they have clicked).

155. Facebook also combines the multi-modal information for content portions and the proximal information for content portions associated with the user path to form a user profile having a unified representation. For instance, Facebook combines data about each user, including what content the user navigated through, what keywords are in that content, what links the user clicked on, tracking information within those links, and descriptive textual information shown with the links in order to build a user profile. Facebook processes this data to form the user profile as a unified vector. In addition, Facebook combines multi-modal information and proximal information to associate the user with specific keywords. For instance, Facebook assigns users to one or more of a subset of predetermined interests or behaviors based on what content the user navigated through, what keywords are in that content, what links the user clicked on, tracking information within those links, and descriptive textual information shown with the links. Interests or behaviors associated with a user are stored within the profile information for that user's profile. *See, e.g.*, https://engineering.fb.com/core-data/recommending-items-to-more-than-a-billion-people/ (explaining that matrix factorization is used to represent users as a vector); https://www.facebook.com/business/help/688346554927374?id=546437386202686 (explaining how Facebook tracks advertising conversions); https://developers.facebook.com/docs/audience-network/targeting (explaining how to

target audiences in Facebook's advertising system); https://www.facebook.com/business/help/182371508761821?id=176276233019487 (describing what detailed targeting options are available); https://www.facebook.com/business/help/440167386536513?id=176276233019487 (describing how to use detailed targeting such as interests or behaviors in advertisements); https://www.facebook.com/help/1701730696756992 (describing storing of a user's interests within their profile information).

156. Facebook clusters multi-modal information and proximal information of user profiles based on similarity. For instance, Facebook advertisements target a plurality of users that are clustered based on multi-modal information and proximal information from each user's profile, including what content the user navigated through, what words or keywords are in that content, what links the user clicked on, tracking information within those links, descriptive textual information shown with the links, or one or more Facebook assigned interests or behaviors based at least partially on the preceding information. For instance, "Detailed Targeting" determines a cluster of user profiles based on similarity of selected "interests" or "behaviors" in the advertising campaign." In addition, "Lookalike Audiences" find clusters of other users on Facebook that are similar to the "source" audience based on demographics; interests; behaviors; and page-, app- and event- connections, among other things. In addition, "Engagement Custom Audiences" determines a cluster of users that have engaged with hosted content across Facebook products, apps, and services, for example, by filling out a lead form, interacting with products, or interacting with specific content. In addition, "Website Custom Audiences" locates a cluster of users that have engaged with third-party content tracked by Facebook Pixel, for example, making a purchase or interacting with a third-party website. *See, e.g.*, https://www.facebook.com/help/794535777607370 (describing that a user is placed within groups to enable advertising based on data tracked by Facebook);

https://www.facebook.com/business/help/717368264947302?id=176276233019487 (explaining Facebook's detailed targeting, Lookalike Audiences, Custom Audiences); https://www.facebook.com/business/help/1823715087618 21?id=176276233019487 (describing some factors on which detailed targeting is based); https://www.facebook.com/business/help/440167386536513?id=176276233019487 (describing how to use detailed targeting to advertise by interest or behavior attributes); https://www.facebook.com/business/help/164749007013531?id=401668390442328 (describing how Lookalike Audiences targets specific clusters of users); https://www.facebook.com/business/help/1090330204367211?id=2469097953376494 (explaining how Engagement Custom Audiences functions); https://www.facebook.com/business/help/610516375684216?id=2469097953376494 (describing how Website Custom Audiences integrates with data captured from Facebook Pixel).



https://www.facebook.com/business/a/custom-to-lookalike-audiences.

157. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1 and 10 of the '475 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making,

using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '475 Infringing Products.

158. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '475 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '475 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1 and 10 of the '475 Patent, literally and/or under the doctrine of equivalents.

159. This Complaint will serve as notice to Facebook of the '475 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

160. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '475 Patent.

161. Facebook provides the '475 Infringing Products and instructions to its users such that they will use the '475 Infringing Products in a directly infringing manner. Facebook markets the '475 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '475 Patent on its website and elsewhere. *See, e.g.*, https://engineering.fb.com/2016/03/09/data-center-engineering/facebook-s-new-front-end-server-design-delivers-on-performance-without-sucking-up-power/; https://www.facebook.com/help/539680519386145; https://www.facebook.com/help/499181503442334; https://www.facebook.com/help/187302991320347?helpref=search&sr=7&query=comment%20tracking&search_session_id=1a5fce02354bdeb5bcd7a36e9aa2909a; https://www.facebook.com/privacy/explanation; https://www.facebook.com/help/1701730696756992; https://www.facebook.com/adpreferences/advertisers/?section=clicked_advertisers; https://developers.facebook.com/docs/marketing-api/conversions-api/parameters/fbp-

and-fbc/; https://www.facebook.com/help/1701730696756992; https://www.facebook.com/business/help/182371508761821?id=176276233019487; https://www.facebook.com/business/help/440167386536513?id=176276233019487; https://www.facebook.com/help/794535777607370; https://www.facebook.com/business/help/164749007013531?id=401668390442328; https://www.facebook.com/business/help/1090330204367211?id=2469097953376494; https://www.facebook.com/business/help/610516375684216?id=2469097953376494.

162. Facebook users directly infringe by using the '475 Infringing Products in their intended manner. Facebook induces such infringement by providing the '475 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '475 Patent or has taken deliberate actions to avoid learning of infringement.

163. Additional allegations regarding Facebook's knowledge of the '475 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

164. Facebook's infringement of the '475 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

165. Facebook's infringement of the '475 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

166. PARC has been damaged by Facebook's infringement of the '475 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

167. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '475 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

SIXTH CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 8,606,781

168. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-167 of this Complaint.

169. The '781 Patent is valid and enforceable under United States Patent Laws.

170. PARC owns, by assignment, all right, title, and interest in and to the '781 Patent, including the right to collect for past damages.

171. A copy of the '781 Patent is attached as Exhibit F.

The '781 Patent

172. The '781 Patent describes, among other things, a method and system for personalized search based on a user's profile and search history. In one embodiment, the '781 Patent describes receiving queries from identifiable users. The '781 Patent further describes retrieving the users' histories (including information previously accessed by the users within a repository), and identifying user profiles that include keywords relevant to the users' histories. The histories are used to determine a "proximal neighborhood" of previously-unseen information with some relationship to the previously accessed information, at which point search results that contain the previously-unseen information may be determined.

173. In 2005, PARC recognized that "[s]earch engines provide a view into the wealth of constantly changing resources available over the web," and that "[c]onventional personalized search systems facilitate the retrieval of previously accessed information by personalizing the search results based on a user profile." '781 Patent at 1:18-23. Yet, the '781 Patent notes that "these systems are not focused on

discovering new-unseen information relevant to the user's current information retrieval goals." *Id.* at 1:30-32.

174. To address this problem, the '781 Patent provides an "invention [to] determine personalized search results." *Id.* at 1:38-39. The '781 Patent does so through the use of user profiles that include a user's history and information linked to that history, which permits the return of relevant, previously-unseen search results. *Id.* at 1:39-51.

175. The invention of the '781 Patent, for example, retrieves a user's search history after a user initiates a query. *Id.* at 2:40-42. By looking at a user's history of previously-accessed documents, an embodiment of the '781 Patent identifies a user profile, including keywords, "based on the documents in the user history." *Id.* at 2:41-42, 2:58-61.

176. In one '781 Patent embodiment, "[a] proximal neighborhood of documents is determined based on the user history," where "the documents in the proximal neighborhood have not yet been seen by the user." *Id.* 2:45-47, 2:55-57. "The proximal neighborhood comprises documents linked within a threshold link distance of previously accessed documents," where the threshold link distance is variable. *Id.* at 2:45-52.

177. The '781 Patent further describes that, for instance, "[t]he user query is applied to the documents within the proximal neighborhood," and that "[t]he search result reflects documents topically related to the user's previous search history but which are further focused by the terms of the current user query." *Id.* at 3:33-37. As the '781 Patent notes, "[t]hese topically related, but as yet unseen documents are likely to be useful to the user." *Id.* at 10:35-36.

'781 Patent Allegations

178. Facebook designed, implemented, and currently uses a variety of advertising tools, such as "targeting," to target ads for its social media platform to

specific groups of users. *See* https://www.facebook.com/business/ads/ad-targeting. Facebook notes that it will "[h]elp your ads find the people who will love your business" and advertisers "can further target [their] ad delivery with three audience selection tools." *Id.* Facebook provides a plurality of advertising targeting methods including interest, behavior, connection, and look-alike, all of which lets advertisers "get [their] Facebook ads in front of the right people." *See* https://www.facebook.com/business/help/633474486707199.

179. On information and belief after reasonable investigation, Facebook's targeted advertising tools ("'781 Infringing Products") infringe the '781 Patent. Facebook provides personalized search. For instance, Facebook provides targeted advertising tools that use tailored audiences to serve ads. *See, e.g.*, https://www.facebook.com/business/ads/ad-targeting (describing Facebook's options for audience targeting); https://www.facebook.com/business/help/1823715087618 21?id=176276233019487 (describing Facebook's detailed targeting); https://www.facebook.com/business/help/164749007013531?id=401668390442328 (describing look-alike audience targeting).

180. Facebook receives a query from a user and identifies the user. For instance, Facebook receives a query from a user every time the user performs an action (*e.g.*, opening a Facebook app or going to a Facebook website; posting, sharing, or replying; interacting with other user's posts, shares, and replies; and other actions in a Facebook app or on a Facebook website), which Facebook uses to customize and deliver ads. Facebook identifies the user in order to provide a custom response, such as on a home page that includes personalized ads targeted to that particular user. *See*, *e.g.*, https://www.facebook.com/business/news/How-Facebook-Ads-Work (discussing how Facebook ads work);

https://www.facebook.com/help/753701661398957?helpref=hc_global_nav (explaining what users see in their home page and news feed).

181. Facebook retrieves a user history for the user comprising access patterns identifying linked information elements previously accessed by the user within an information repository. For instance, Facebook retrieves historical user activity, such as users, pages, or groups a user follows; what a user posts, searches, views, or interacts with; what accounts a user interacts with; the user's profile and location; what websites a user visits; what apps are downloaded on the user's device; a user's demonstrated interests; what ads the user has interacted with; what type of device the user is accessing Facebook from, and browser-related information, among other things. *See*, *e.g.*, https://www.facebook.com/help/930396167085762 (discussing types of data Facebook collects on each user); https://www.facebook.com/privacy/explanation (discussing what types of data Facebook collects and how it is used) https://www.facebook.com/business/help/182371508761821?id=176276233019487 (discussing how Facebook uses information to target advertisements).

182. Facebook identifies a user profile comprising keywords relevant to the access patterns in the user history. For instance, Facebook user profiles store keywords relevant to the user's history, such as what pages or groups the user has liked, followed, or otherwise interacted with; what words are used in the user's search queries; recent posts and shares; other posts or content that the user has recently interacted with; the user's profile, device, and location; and what ads they have clicked on or seen. Facebook also tracks users outside of Facebook—including a user's website visits, downloaded apps, and browser-related information—and ties users' non-Facebook activity to Facebook user profiles, using tracking information embedded in hyperlinks and Facebook Pixel, among other methods. In addition, Facebook combines the previous information to infer and associate interest, behaviors,

and demographic information with a user's profile. *See*, *e.g.*, https://www.facebook.com/business/help/182371508761821?id=176276233019487 (discussing how Facebook targeting works); https://www.facebook.com/business/ads/ (describing how Facebook ads work); https://www.facebook.com/business/help/742478679120153?id=1205376682832142 (describing how Facebook Pixel works); https://www.facebook.com/terms.php (describing how Facebook uses interests associated with a user's personal data to serve relevant advertisements); https://www.facebook.com/help/930396167085762 (describing personal information that Facebook tracks and stores for each user).

183. Facebook determines a proximal neighborhood using the user history in the user profile, wherein the proximal neighborhood comprises only linked information elements previously unseen by the user that are within a threshold distance of the linked information elements in the user history. For instance, Facebook tracks advertisements that each user has seen or engaged with and stores that information in the user's history. Facebook does this, for example, when Facebook advertisers build audiences for their advertisements using interest targeting, behavior targeting, connection targeting, engagement targeting, device or platform targeting, and/or when advertisers build look-alike audiences based on characteristics of users who have already liked, followed, or engaged with the advertiser. The user history is further used to determine whether the advertisement should be considered for the advertisement selection process. For example, Facebook only considers for the ad auction advertisements that a user has not previously seen, including within a previous time period. Further, Facebook also only considers for the ad auction advertisements that are not linked to advertisers or pages which a user has previously seen, including within a previous time period. Facebook further scores advertisements based on the expected response from a user, such as whether the user is likely to engage with or convert from a particular advertisement. As a result, the proximal neighborhood

consisting of ads that are selected for scoring in the ad selection process, for example scoring prior to a Facebook ad auction, includes only ads previously unseen, including ads previously unseen in the prior time period for which a user belongs to the target audience. *See, e.g.,* https://business.facebook.com/business/help/285326585139636?id=561906377587030 (discussing the advantages behind Facebook limiting the amount that ads are shown to users); https://www.facebook.com/business/ads/ad-targeting (discussing Facebook's audience targeting options for advertisers); https://www.facebook.com/business/help/430291176997542?id=561906377587030 (detailing Facebook ad placement criteria and ad auctions); https://www.facebook.com/business/help/410873986524407 (discussing call-to-action options available within advertisements); https://business.facebook.com/business/help/1000688343301256?id=561906377587030 (discussing how Facebook provides relevant advertisements to each user).

184. Facebook applies the query to the unseen linked information elements in the proximal neighborhood and determines search results comprising the unseen linked information elements that match the query. For instance, when Facebook receives the user's query as described above, it determines which ads to serve that particular user. Multiple candidate advertisements that the user has not previously seen, including within a previous time period for which the user belongs to the target audience group, are scored to determine an estimated action rate and an ad quality rating. For example, the Facebook ad auction process uses this information in conjunction with the advertiser's bid amount to determine one or more advertisements from the proximal neighborhood that the user has not previously seen, including within a time period, that is related to interests, behaviors, demographics, or other information linked to the user's profile to show to the user on a Facebook platform. *See, e.g.,*

https://business.facebook.com/business/help/285326585139636?id=561906377587030 (discussing the advantages behind Facebook limiting the amount that ads are shown to users); https://www.facebook.com/business/ads/ad-targeting (discussing Facebook's audience targeting options for advertisers); https://www.facebook.com/business/help/430291176997542?id=561906377587030 (detailing Facebook ad placement criteria and ad auctions); https://www.facebook.com/business/help/410873986524407 (discussing call-to-action options available within advertisements); https://business.facebook.com/business/help/1000688343301256?id=561906377587030 (discussing how Facebook provides relevant advertisements to each user).

185. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1 and 19 of the '781 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '781 Infringing Products.

186. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '781 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '781 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1 and 19 of the '781 Patent, literally and/or under the doctrine of equivalents.

187. This Complaint will serve as notice to Facebook of the '781 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

188. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '781 Patent.

189. Facebook provides the '781 Infringing Products and instructions to its users such that they will use the '781 Infringing Products in a directly infringing manner. Facebook markets the '781 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '781 Patent on its websites and elsewhere. *See, e.g.*, https://www.facebook.com/business/ads/ad-targeting; https://www.facebook.com/business/help/633474486707199; https://www.facebook.com/business/help/1823715087618 21?id=176276233019487; https://www.facebook.com/business/help/164749007013531?id=401668390442328; https://www.facebook.com/business/news/How-Facebook-Ads-Work; https://www.facebook.com/help/753701661398957?helpref=hc_global_nav; https://www.facebook.com/help/930396167085762; https://www.facebook.com/privacy/explanation; https://www.facebook.com/business/ads/; https://www.facebook.com/business/help/742478679120153?id=1205376682832142; https://www.facebook.com/terms.php; https://business.facebook.com/business/help/285326585139636?id=561906377587030; https://www.facebook.com/business/help/430291176997542?id=561906377587030; https://www.facebook.com/business/help/410873986524407; https://business.facebook.com/business/help/1000688343301256?id=5619063775870.

190. Facebook users directly infringe by using the '781 Infringing Products in their intended manner. Facebook induces such infringement by providing the '781 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '781 Patent or has taken deliberate actions to avoid learning of infringement.

191. Additional allegations regarding Facebook's knowledge of the '781 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

192. Facebook's infringement of the '781 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

193. Facebook's infringement of the '781 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

194. PARC has been damaged by Facebook's infringement of the '781 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

195. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '781 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

SEVENTH CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 7,167,871

196. Plaintiff realleges and incorporates by reference the allegations of paragraphs 1-195 of this Complaint.

197. The '871 Patent is valid and enforceable under United States Patent Laws.

198. PARC owns, by assignment, all right, title, and interest in and to the '871 Patent, including the right to collect for past damages.

199. A copy of the '871 Patent is attached as Exhibit G.

The '871 Patent

200. The '871 Patent describes, among other things, a system and method of determining the reliability of a document based on its textual contents. In one embodiment, the '871 Patent describes a system that extracts document content feature values based on the document's textual contents, and processes them to determine the reliability of the document. To make the reliability determination, the system may use a trained model, statistical processes, and/or metric-regression algorithms. Furthermore, the reliability decision under the '871 Patent may also consider the document author's background, any association of the author with a particular institution, and other cues affecting the document's reliability.

201. By 2002, PARC recognized that the proliferation of information available on the Internet came at a cost:

> A notoriously difficult problem in using large heterogeneous document collections, such as the World Wide Web (the "Web"), is that it is not easy to recognize which documents, for example, which web pages and web documents, provide reliable authoritative information about a subject.

'871 Patent at 1:13-18.

202. This problem has recently gained significant notoriety with the proliferation of misinformation on social media websites. As the '871 Patent states, "[t]he fact that a text is widely referenced may not by itself assure that it is authoritative." *Id.* at 2:10-12. "[L]arge amount[s] of misinformation," especially for high-value information like medical issues and informational news, have exacerbated the issue such that PARC set about to solve it. *Id.* at 2:12-15. Rather than determining reliability based on the popularity or wide-spread circulation of Internet-based information, PARC invented a method and system for analyzing the text of the document itself for cues of its reliability. *Id.* at 2:30-41.

203. To assess a document's reliability, in one embodiment the '871 Patent uses a set of document content features—such as punctuation, certain words or text, hyperlinks, images, document length, readability, author background, institutional affiliation of the author, etc.—that may be present in a web document. *Id.* at 6:47-58; 9:41-46; Figs. 3, 5. The document content features "may vary according to the specific application, training data, particular web-based document features and the like." *Id.* at 7:16-18.

204. The invention of the '871 Patent, in one embodiment, determines values associated with the document content features based on the document's text, and those values are used to determine the reliability of the document. For example, the '871 Patent system "determines a set of document content feature values for a document by processing one or more of the selected document content features." *Id.* at 7:20-23. The processing may be implemented as "one or more of parsing and mathematical processes or methods." *Id.* at 7:26-28.

205. In one embodiment, the '871 Patent then "determines a document's textual authoritativeness value using the one or more determined document content feature values." *Id.* at 7:43-46. The authoritativeness decision is made by a computer model that is "trained on a large sample of documents." *Id.* at 6:39-41. The training of the computer model "may not be entirely automatic. Rather, instructions…may be manually or automatically executed." *Id.* at 9:3-8.

206. The trained computer model in one embodiment of the '871 Patent may implement "one or more statistical processes or techniques" to make an authoritativeness decision. *Id.* at 7:51-53. These processes and techniques may include a variety of statistical, regression, or classification processes, such as a metric-regression algorithm, a boosted decision tree algorithm, an AdaBoost algorithm model, an ordinal regression process, or a multi-class classification process, among others. *Id.* at 7:58-8:13.

207. The authoritativeness decision, which indicates whether the information in the document is reliable, is then output by the system. *Id.* at 3:4-6.

'871 Patent Allegations

208. Facebook designed, implemented, and currently uses a variety of computer algorithms and tools—called "machine learning"—when evaluating content for its social media platform and News Feed. *See* https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation). Facebook "appl[ies] machine learning to assist [] response teams in detecting fraud and enforcing [Facebook] policies against inauthentic spam accounts." *See* www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (describing Facebook's efforts to fight against misinformation). Facebook leverages these machine-learning tools in its "fight against misinformation," and particularly the "dangerous" information it deems to have a "low amount of truth" and a "high intent to mislead." *See* Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at https://www.youtube.com/watch?v=zgkF23nFIBw (describing Facebook's efforts to fight against misinformation). Facebook trained its computer model by "showing it examples of false content, and it can derive from that patterns that it can use to flag potentially incorrect content in the future." *Id.* Facebook uses these computer models to "detect even the most nuanced version of misinformation." *Id.*

209. Facebook moved away from its original reliance on users flagging misleading information and moved towards an AI-based model. In fact, in the third quarter of 2019, Facebook blocked 1.7 billion accounts for false or misleading news. Of those accounts, Facebook's AI-enabled tools took action against some 99.7% of fake accounts before other users flagged them for a human review team. https://fortune.com/2020/03/04/facebook-a-i-fake-accounts-disinformation/. Further,

Facebook continued to work on improvements to its AI-enabled tools used in the detection of false news and misinformation leading up to November 2020. https://research.fb.com/wp-content/uploads/2020/08/TIES-Temporal-Interaction-Embeddings-For-Enhancing-Social-Media-Integrity-At-Facebook.pdf.

210. In order to accomplish this, Facebook uses a two-pronged—and, as detailed herein, infringing—approach. First, the deep features of an account are fed through a multi-layer neural network based on the human brain. Then, the statistical patterns from that account are fed through a second step which runs an algorithm called a gradient-boosted decision tree, which scores the account. These scores determine Facebook's action towards the account. The result is a program that determines false accounts and false or misleading news with 97% accuracy. https://fortune.com/2020/03/04/facebook-a-i-fake-accounts-disinformation/.

211. More recently, Facebook has also taken a stance against false, misleading, and exploitative information about COVID-19. In April 2020, Facebook weeded out and flagged 50 million false posts and 2.5 million exploitative ads for COVID-19 related products such as PPE and testing kits. https://www.analyticsinsight.net/facebook-uses-ai-fight-coronavirus-misinformation-fake-news/.

212. In this work, Facebook employed both its multimodal algorithm set and its Simsearchnet technology, a similarity detector powered by AI based on neural networks to detect the difference between images that look similar but carry different information to flag false and misleading posts based on inputs from human fact checkers. The new system compares new posts to old posts that have previously been flagged misleading.[15]

[15] *Id. See also Using AI to detect COVID-19 Misinformation and Exploitative Content* FACEBOOK AI (May 12, 2020) https://ai.facebook.com/blog/using-ai-to-detect-

213. Not only does Facebook use AI to ferret out false and misleading news, but also to prevent false and misleading advertising. https://ai.facebook.com/blog/using-ai-to-detect-covid-19-misinformation-and-exploitative-content.

214. When a story is deemed "false," Facebook ranks that story lower in a user's News Feed. *See* https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against false news). As another check on the spread of false stories or other misinformation, Facebook notifies users when they attempt to share a story identified as false news:

Id.

215. On information and belief after reasonable investigation, Facebook's machine-learning tools and algorithms used to protect the integrity of user's News Feeds and to stop the spread of false/misleading news, accounts, advertising, or other misinformation ("'871 Infringing Products") infringe the '871 Patent. Facebook

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covid-19-misinformation-and-exploitative-content/.

operates a method for determining an authoritativeness of a document having a plurality of document content features. For instance, Facebook operates machine-learning tools and algorithms that determine the authoritativeness of posts, articles, stories, accounts, advertisements, and other features of their social media platform. The false stories, posts, articles, accounts, advertising, and other features include a plurality of document content features, such as text, punctuation, account names, images, videos, hyperlinks, text characteristics, and readability. *See, e.g.,* https://about.fb.com/news/2018/06/hard-questions-fact-checking/ (describing Facebook's efforts at fact-checking); https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation); Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at https://www.youtube.com/watch?v=zgkF23nFIBw (same); and www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (same).

216. Facebook determines a set of document content feature values of a document based on textual contents in the document, the document providing information regarding a subject. For instance, Facebook posts, stories, articles, accounts, advertising, and other features provide information on a subject. Facebook determines a set of document content feature values based on the text of the posts, stories, articles, accounts, advertising, and other features. For example, Facebook determines values associated with click-, tag-, or comment-baiting text; the falsity of photos, videos, text, posts, and advertising; and/or the sensationalism or inflammatory nature of text or headlines. *See, e.g.,* https://about.fb.com/news/2018/06/hard-questions-fact-checking/ (describing Facebook's efforts related to fact-checking); https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation); Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at

https://www.youtube.com/watch?v=zgkF23nFIBw (same); www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (same); https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/ (same); https://about.fb.com/news/2018/10/inside-feed-hunt-false-news-october-2018/ (same).

217. Facebook determines the authoritativeness of the document based on the determined set of document content feature values using a trained document textual authority model. For instance, Facebook determines whether a post, story, article, account, advertisement, or other feature is false or contains misinformation based on the values described above. Facebook uses a computer model trained with examples of false content. *See, e.g.,* https://about.fb.com/news/2018/06/hard-questions-fact-checking/ (describing Facebook's efforts related to fact-checking); https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation); Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at https://www.youtube.com/watch?v=zgkF23nFIBw (same); www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (same); https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/ (same); https://about.fb.com/news/2018/10/inside-feed-hunt-false-news-october-2018/ (same).

218. Facebook determines the authoritativeness by determining a reliability of the document, where the reliability is indicative of whether the information, as provided in the document, is reliable regarding the subject. For instance, Facebook determines whether the post, story, article, account, advertisement, or other feature is reliable regarding the subject by determining whether accounts are authentic, or whether posts, stories, articles, advertisements, or other features are false or contain misinformation. *See, e.g.,* https://about.fb.com/news/2018/06/hard-questions-fact-

checking/ (describing Facebook's efforts related to fact-checking); https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation); Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at https://www.youtube.com/watch?v=zgkF23nFIBw (same); www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (same); https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/ (same); https://about.fb.com/news/2018/10/inside-feed-hunt-false-news-october-2018/ (same).

219. Facebook outputs the determined authoritativeness in association with the document. For instance, Facebook displays a notification when a story, post, article, or other feature is false or contains misinformation:

https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation). In addition, Facebook outputs the authoritativeness decision to other reviewers to confirm that a post, story, article, account, advertisement, or other feature is false. *See, e.g.*, https://about.fb.com/news/2018/06/hard-questions-fact-checking/ (describing

Facebook's efforts related to fact-checking); https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/ (describing Facebook's efforts to fight against misinformation); Facebook video titled "Facing Facts: An Inside Look at Facebook's Fight Against Misinformation" at https://www.youtube.com/watch?v=zgkF23nFIBw (same); www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news (same); https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/ (same); https://about.fb.com/news/2018/10/inside-feed-hunt-false-news-october-2018/ (same); https://about.fb.com/news/2017/04/news-feed-fyi-new-test-with-related-articles/ (describing Facebook's efforts related to fact-checking); and https://about.fb.com/news/2018/09/expanding-fact-checking/ (same).

220. Facebook has infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claims 1, 16, and 21 of the '871 Patent in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '871 Infringing Products.

221. Facebook has been, and currently is, an active inducer of infringement of one or more claims of the '871 Patent under 35 U.S.C. § 271(b). On information and belief, one or more of the '871 Infringing Products of Facebook directly and/or indirectly infringe (by induced infringement) at least claims 1, 16, and 21of the '871 Patent, literally and/or under the doctrine of equivalents.

222. This Complaint will serve as notice to Facebook of the '871 Patent and its infringement should Facebook contend that it did not previously have knowledge thereof.

223. Facebook intentionally encourages and aids at least its users, including advertisers and website and app users, to directly infringe the '871 Patent.

224. Facebook provides the '871 Infringing Products and instructions to its users such that they will use the '871 Infringing Products in a directly infringing manner. Facebook markets the '871 Infringing Products to its users and provides instructions to its users on how to use the functionality of the '871 Patent on its website and elsewhere. *See, e.g.*, https://about.fb.com/news/2018/04/inside-feed-misinformation-zigmond/; www.facebook.com/formedia/blog/working-to-stop-misinformation-and-false-news; https://about.fb.com/news/2018/06/hard-questions-fact-checking/; https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/; https://about.fb.com/news/2018/10/inside-feed-hunt-false-news-october-2018/.

225. Facebook users directly infringe by using the '871 Infringing Products in their intended manner. Facebook induces such infringement by providing the '871 Infringing Products and instructions to enable and facilitate infringement. On information and belief, Facebook specifically intends that its actions will result in infringement of the '871 Patent or has taken deliberate actions to avoid learning of infringement.

226. Additional allegations regarding Facebook's knowledge of the '871 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

227. Facebook's infringement of the '871 Patent is willful and deliberate, entitling PARC to enhanced damages and attorneys' fees.

228. Facebook's infringement of the '871 Patent is exceptional and entitles PARC to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

229. PARC has been damaged by Facebook's infringement of the '871 Patent and will continue to be damaged unless Facebook is enjoined by this Court. PARC has suffered and continues to suffer irreparable injury for which there is no adequate

remedy at law. The balance of hardships favors PARC, and public interest is not disserved by an injunction.

230. PARC is entitled to recover from Facebook all damages that PARC has sustained as a result of Facebook's infringement of the '871 Patent, including without limitation, lost profits and/or not less than a reasonable royalty.

PRAYER FOR RELIEF

WHEREFORE, PARC prays for a judgment in its favor and against Facebook and respectfully requests the following relief:

1. A judgment declaring that Facebook has infringed one or more claims of each of the PARC Patents in this litigation pursuant to 35 U.S.C. §§ 271(a) and/or 271(b);

2. An injunction pursuant to 35 U.S.C. § 283 permanently enjoining Facebook, its officers, directors, attorneys, agents, servants, employees, parties in privity with, and all persons in active concert or participation with, any of the foregoing, from continued acts of infringement, contributing to infringement, or inducing infringement of the PARC Patents in this litigation;

3. A judgment requiring Facebook to make an accounting of damages resulting from Facebook's infringement of the PARC Patents in this litigation;

4. A judgment awarding PARC its damages resulting from Facebook's infringement of the PARC Patents in this litigation, and increasing such damages pursuant to 35 U.S.C. § 284 because of the willful and deliberate nature of Facebook's conduct;

5. A judgment requiring Facebook to pay PARC's costs, expenses, and pre-judgment and post-judgment interest for Facebook's infringement of each of the PARC Patents in this litigation;

6. A judgment finding that this is an exceptional case and awarding PARC's attorneys' fees pursuant to 35 U.S.C. § 285; and

7. Such other relief as the Court deems just and proper.

DATED: November 25, 2020

Respectfully submitted,

MCKOOL SMITH, P.C.

BY: */s/ Alan P. Block*

ALAN P. BLOCK

ATTORNEYS FOR PLAINTIFF
PALO ALTO RESEARCH CENTER INC.

DEMAND FOR JURY TRIAL

In accordance with Rule 38 of the Federal Rules of Civil Procedure and Local Rule CV-38-1, Plaintiff respectfully demands a jury trial of all issues triable to a jury.

DATED: November 25, 2020 Respectfully submitted,

MCKOOL SMITH, P.C.

BY: */s/ Alan P. Block*

ALAN P. BLOCK

ATTORNEYS FOR PLAINTIFF
PALO ALTO RESEARCH CENTER INC.