EXHIBIT 33

1 Michael W. Sobol (State Bar No. 194857)
   msobol@lchb.com
2 David T. Rudolph (State Bar No. 233457)
   drudolph@lchb.com
3 Melissa Gardner (State Bar No. 289096)
   mgardner@lchb.com
4 LIEFF CABRASER HEIMANN & BERNSTEIN, LLP
   275 Battery Street, 29th Floor
5 San Francisco, CA 94111-3339
   Telephone: 415.956.1000
6 Facsimile: 415.956.1008

7 Hank Bates (State Bar No. 167688)
   hbates@cbplaw.com
8 Allen Carney
   acarney@cbplaw.com
9 David Slade
   dslade@cbplaw.com
10 CARNEY BATES & PULLIAM, PLLC
   11311 Arcade Drive
11 Little Rock, AR 72212
   Telephone: 501.312.8500
12 Facsimile: 501.312.8505

13 *Attorneys for Plaintiffs and the Proposed Class*

14

15   UNITED STATES DISTRICT COURT

16   NORTHERN DISTRICT OF CALIFORNIA

17

18 MATTHEW CAMPBELL and MICHAEL   Case No. C 13-05996 PJH (MEJ)
    HURLEY, on behalf of themselves and all
19 others similarly situated,   **REPORT OF FERNANDO TORRES IN
                                      SUPPORT OF PLAINTIFFS' MOTION
20   Plaintiff,   FOR CLASS CERTIFICATION**

21 v.   Judge: Honorable Phyllis J. Hamilton

22 FACEBOOK, INC.,   **HEARING**
                                      Date: March 16, 2016
23   Defendant.   Time: 9:00 a.m.
                                      Place: Courtroom 3, 3rd Floor
24   The Honorable Phyllis J. Hamilton

25

26

27

28

I. Experience and Qualifications

1. I am a professional economist and have over 30 years' experience in applied and theoretical economics. In the course of this experience, I have been a consultant, a university professor, and a business manager. Both my undergraduate and post-graduate degrees are in economics, the latter with a concentration in econometrics. Econometrics is the application of mathematics, statistical methods, and computer science to economic data. Since 2004, I have specialized in the analysis and valuation of intellectual property and intangible assets. Currently I am a member and Chief Economist of IPmetrics LLC, an intellectual property consulting firm.

2. During the past ten years, I have undertaken a plurality of valuation engagements where I have appraised the value of a variety of intangible assets in several contexts, such as for licensing and transaction rate setting, for loan collateral analysis, and generally to assist in the decision making process regarding the economic role of intangible assets, including intellectual property. I also regularly give presentations and write about valuation techniques as applicable to intangibles, and have co-designed and taught the course "Valuing Intangible Assets for Litigation" for the National Association of Valuation Analysts.

3. Additionally, I have served as a consultant on numerous cases involving intellectual property infringement contract issues and contractual disputes. I have prepared over 50 expert reports and have trial, arbitration, and deposition experience as an expert witness on behalf of both plaintiffs and defendants. I have experience in complex commercial litigation cases nationally. I currently consult with and have consulted with clients in California, New York, Texas, Colorado, and Florida.

4. In the course of my career, I have observed the evolution of online social networks and advertising, both as a business owner and as an economist. In the vast majority of intellectual property infringement cases I have worked on, online advertising and the leverage of information to support such activity play a central role. I have long studied and analyzed how online advertising works as well as the nature of the markets that evolve out of, and are supported by, the internet. Understanding these markets has been enabled not only by my education in economics, but also been informed by my knowledge of programming acquired first in college as

a tool for the analysis of economic phenomena, and later in my professional life having developed a financial statement analysis and forecasting software system,[1] and an inventory and billing management system for an acute care hospital.[2]

5. In recent years, I have been called upon to testify in cases where the intersection of social media and advertising has been alleged to have breached rights and principles of privacy, publicity, trademarks, and patents. In some cases, the issues I have reported on for the courts were the benefits derived by the social media/advertising platform infringing the rights of publicity of a class of users,[3] while in others the issue has been the economic value of social media marketing in sustaining the viability of traditional media properties.[4] Moreover, many trademark infringement and trade secret cases also tend to involve the analysis and assessment of online advertising activity.[5]

6. I am being compensated for my work in this case at the rate of $375 per hour. Attached hereto as Exhibit A is a copy of my most current curriculum vitae setting forth in detail my qualifications and experience.

II.   Introduction, Assignment, and Summary of Conclusions

7. The Plaintiffs' Consolidated Amended Class Action Complaint (the "CAC")[6] alleges that Facebook utilizes information surreptitiously gathered from purportedly "private" correspondence sent between Facebook users, and uses that information in a number of ways, including:

---

[1] The software system was distributed to the nearly 500 nationalized industrial companies in Mexico to coordinate budgeting and for which I received a Diploma for Public Service from the Federal Government of Mexico in 1988.

[2] Developed for a private hospital in 1991 in Ensenada, Baja California, Mexico.

[3] In: *Fraley et al. v. Facebook, Inc.*, case 11-1726 before the USDC for the Northern District of California.

[4] In: *S. Mattocks v. Black Entertainment Television, LLC,* case 13-61582 before the USDC for the Southern District of Florida.

[5] In, *e.g.*, *Gen. C.E. Yeager v. Aviat Aircraft Inc. and S. Horne*, case 10-CV-2055 before the USDC for the Eastern District of California; *Laserfiche v. SAP A.G.*, case 10-7843 (USDC for the Central District of California); and *Estate of Michael Jackson, et al., v. Howard Mann, et al.*, case 11-cv-584 (USDC for the Central District of California).

[6] Consolidated Amended Class Action Complaint, filed April 25, 2014.

REPORT OF FERNANDO TORRES IN SUPPORT OF
PLAINTIFFS' MOTION FOR CLASS CERTIFICATION;
C 13-05996 PJH (MEJ)

a. to increment the "Like" counts of third party websites that installed Facebook's "Like" button social plug-in until, on information and belief, at least October 2012;[7]

b. to catalogue information about specific URLs that were shared and use that information for targeted advertising or other purposes;[8] and

c. to catalogue information about Facebook users who shared such URLs and use that information for targeted advertising or other purposes.[9]

8.   According to the CAC, the putative Class Period began on December 30, 2011.[10] I understand that the practice of scanning the content of private messages continues to date, although the impact on "Like" counter may have continued through December 2012.[11]

9.   I further understand that the Plaintiffs are seeking certification of the following Class:

> All natural-person Facebook users located within the United States who have sent, or received from a Facebook user, private messages that included URLs in their content (and from which Facebook generated a URL attachment), from within two years before the filing of this action up through the date of class certification.

10.   In this context, I have been asked to analyze the following questions with regard to the Class defined above:

a. Is there proof common to the proposed Class capable of showing that—and how much—Facebook profited or otherwise benefited from the Electronic Communications Privacy Act ("ECPA") and the California Invasion of Privacy Act ("CIPA") violations alleged in the CAC?

b. Is there a reliable Class-wide or formulaic method capable of quantifying the amount of such profits or value of such benefits to Facebook and of allocating those profits to the Class?

11.   Based upon my work to date, I have reached the following conclusions:[12]

---

[7] *Id.* at §§27, 39.

[8] *E.g.*, *Id.* at §86.

[9] *E.g.*, *Id.* at §30.

[10] *Id.* at §59.

[11] *Id.* at §§27, 39.

[12] It is, of course, possible that with additional information, including production from Facebook, and inputs, these conclusions could be refined. The list of documents I have considered in forming my opinions is attached to this report as Exhibit B.

REPORT OF FERNANDO TORRES IN SUPPORT OF PLAINTIFFS' MOTION FOR CLASS CERTIFICATION; C 13-05996 PJH (MEJ)

a. There is evidence common to the Class capable of showing that Facebook profited or otherwise benefited from the scanning alleged to violate ECPA and CIPA in the CAC. Specifically, as explained in the body of this report, I have concluded that the profits or other unjustly-obtained benefits may be analyzed and quantified based upon Facebook's records without reference to individual proof with respect to any member of the Class, such Class membership being identifiable and ascertainable based upon Facebook's records.

b. Class-wide evidence capable of showing profits or other benefits to Facebook falls into two categories (1) evidence concerning Facebook's use of information derived from private messages by creating associations within Facebook's Social Graph (described in more detail below); and (2) evidence concerning Facebook's profits or other benefits resulting from its campaign to encourage third-party websites ("Marketers") to install the Facebook Like button, of which, as alleged, Facebook's unlawful scanning was an integral part.

c. Standard economic methods are capable of reliably quantifying the aggregate amount of profits to Facebook, and the aggregate value of other benefits to Facebook that resulted from scanning and subsequent uses or potential uses of the information derived therefrom.

d. The damages calculated are based on the economic benefits the Defendant received from the information intercepted from the private messages sent by the Class members. Facebook benefits from advertising revenue from adding the intercepted user-URL links into their targeting platform and from enhancing their understanding of how and what users share links to. The benefit is defined not only by the potential act of generating additional revenue from targeting ads to the senders of intercepted messages, but also by the additional use in better targeting these and similar users (in marketing terms); and the benefit is ultimately proportional to the number of URLs intercepted from private messages.

III. Case Background

A. Facebook, Inc.

12. Facebook operates the world's largest social marketing and information platform. The social network side of the business has over 1.5 billion users around the world.[13] On August

[13] Measured as monthly active users ("MAUs"), which Facebook defines as "a registered Facebook user who logged in and visited Facebook through our website or a mobile device, used our Messenger app, or took an action to share content or activity with his or her Facebook friends or connections via a third-party website or application that is integrated with Facebook, in the last 30 days as of the date of measurement" (Facebook, 2014 10-K Page 35). Current MAUs from: Facebook, Inc.'s 2015 Q3 Earnings Report (November 4, 2015) Slide 5. At http://investor.fb.com/results.cfm.

24, 2015, 1 in 7 people on Earth used Facebook,[14] which is equivalent to approximately 51% of all internet users worldwide.[15] In the U.S. and Canada, there are currently 217 million (monthly active) users[16] which represent 61% of 357 million people in the region.[17] Facebook's advertising network generates revenue in excess of $1.4 billion monthly,[18] 49.3% of which is attributable to users in the U.S. and Canada.[19] Furthermore, Facebook's most recent disclosure states that, in the U.S. and Canada, Facebook users performed advertising revenue-generating activities at a rate of $9.86 per quarter per user.[20]

13. Facebook's online social networking service allows users to communicate through the sharing of text, photograph, video, and internet content. In addition, these activities are supported by a variety of Facebook applications on mobile devices, including Facebook Messenger, Instagram and WhatsApp.[21] While Facebook positions its business as focused on "creating value for people, [M]arketers, and developers," it generates the bulk of its revenues from the latter two categories and then principally to the degree they want to reach the former.

14. Facebook represents a significant opportunity for Marketers due to the combination of the size of the user base and the abundance of rich user data.[22] Thus, access to the wealth of information captured on Facebook enables advertisers to reach people across devices

---

[14] Facebook CEO Mark Zuckerberg's public post on Facebook.com of August 27, 2015, at: (https://www.facebook.com/zuck/posts/10102329188394581).

[15] Based on the current estimate of worldwide internet users of 2.919 billion people (14.04 million in the USA) according to the Wolfram|Alpha Knowledgebase, using data from the World Bank (http://www.wolframalpha.com/ accessed 10/26/15).

[16] Facebook, Inc.'s 2015 Q3 Earnings Report, Slide 5 (*op cit.*).

[17] According to U.S. Census projections (321.37 million people in the USA in July 2015) and Statistics Canada estimates (35.85 million people in Canada in July 2015) [In: http://www.census.gov/population/projections/data/national/2014/summarytables.html, and http://www.statcan.gc.ca/pub/91-002-x/2015002/t002-eng.pdf].

[18] Facebook, Inc.'s 2015 Q3 Earnings Report, Slide 8 (*op cit.*), quarterly data divided by three.

[19] Facebook, Inc.'s 2015 Q2 Earnings Report, Slide 10 (*op cit.*).

[20] This is the ratio of quarterly revenue to monthly active users per Facebook, Inc.'s 2015 Q3 Earnings Report, Slide 12 (*op. cit.*).

[21] Facebook, 2014 10-K Page 5 (User and Revenue data cited above do not include Instagram or WhatsApp users).

[22] As expressed by Facebook's Adam Isserlis, Manager, Corporate Communications, Ads/Monetization; Colleen Coulter, Product Marketing Communications Manager, in "IAB Social Media Buyers Guide" available on the Interactive Advertising Bureau website (http://www.iab.net/socialmediabuyersguide).

REPORT OF FERNANDO TORRES IN SUPPORT OF
PLAINTIFFS' MOTION FOR CLASS CERTIFICATION;
C 13-05996 PJH (MEJ)

and, importantly, to effectively measure the impact of their advertising. In its public disclosures, Facebook emphasizes that the platform creates value for Marketers by its unique combination of:

     a. *Reach*, with over a billion and a half monthly active users in 2015;[23]

     b. *Relevance*, supporting ad targeting by rich demographics and interests data plus Marketers' and third party data cross referencing;[24]

     c. *Social Context*, by providing information to leverage recommendations from friends;[25] and,

     d. *Engagement*, with ad products prompting interaction and sharing.[26]

15.   In this report, I will refer to advertisers that use Facebook's website and the corresponding development tools to leverage the targeted access to the massive user base as 'Facebook Marketers' or simply 'Marketers.'

16.   Facebook also represents an important platform for software developers by providing access to a substantial user base, a payment management mechanism, and analytical information about the use of applications.[27]

17.   Facebook has built a dominant position in the social networking market and, as such, attracts a significant amount of consumers' time and attention. According to the Business Intelligence Report on Social Engagement, in 2013 Americans spent an average of 37 minutes daily on social media, a higher time-spend than any other major internet activity, including email.[28] More recently, Facebook claims that "when it comes to time spent by users of the platform, across Facebook, Messenger and Instagram, people are now spending more than 46 minutes per day on average."[29] This amount of attention is leveraged by Facebook in providing

---

[23] Facebook, Inc.'s 2015 Q3 Earnings Report, Slide 5 (*op cit.*). and Facebook, Inc. Form 10K 2012, p. 7.

[24] Facebook, Inc. Form 10K 2012, p. 7.

[25] *Id.*, p. 8.

[26] *Id.*

[27] Facebook for Developers website: https://developers.facebook.com/.

[28] Business Insider, Business Intelligence Report on Social Engagement (http://www.businessinsider.com/social-media-engagement-statistics-2013-12).

[29] Mark Zuckerberg's remarks during the Second Quarter, 2015 Earnings Call (page 1 of the

Marketers access to a relevant and sizable audience, and now constitutes the company's overwhelming source of revenue; currently, advertising accounts for 95.5% of Facebook's revenue.[30]

18.   From an economic perspective, Facebook is thus a platform business and operates a two-sided market. That is, much like broadcast television and terrestrial radio in the past,[31] Facebook essentially sells to Marketers access to "the thoughts and emotions" of an audience aggregated on the basis of providing online social media products and user-generated content to "users," rather than simply the transmission of content. In sharp contrast to broadcast media, with Facebook the access is readily measurable and the advertising messages finely targeted and distributed. Thus, essentially, on one side of the market Facebook accrues users providing online products,[32] and on the other it sells advertising placements to Marketers. Furthermore, on the user acquisition side, Facebook competes with other social media offerings, such as Twitter and Google+, and with other online activities (including news and video reading/watching). Further, Facebook is developing the platform as a portal through which users can access news,[33] discover content by searching,[34] and incorporate more and more online activities.[35] On the advertising sales side, Facebook competes with both online advertising outlets, such as Google AdWords and DoubleClick,[36] and off-line advertising media (including traditional broadcast TV and print advertising). Facebook's competitive advantage stems from the power of leveraging the deep

Footnote continued from previous page
transcript) held on July 29, 2015. Available at: http://investor.fb.com/results.cfm.

[30] Facebook, Inc.'s 2015 Q3 Earnings Report, Slide 8 (*op cit.*).

[31] *See*, *inter alia*, Ch. 7-Broadcasting in: H. Vogel, Entertainment Industry Economics, Cambridge University Press, 8th Ed., 2011.

[32] As a company, these products now include Instagram and WhatsApp, expanding the original Facebook and then Messenger products. Facebook, 2014 10-K, p. 5.

[33] For example, with the introduction of the "Instant Articles" initiative and new deals with publishers like the Washington Post (http://media.fb.com/2015/05/12/instantarticles/).

[34] *E.g.*, with expanding the power of Facebook search (http://newsroom.fb.com/news/2015/10/search-fyi-find-what-the-world-is-saying-with-facebook-search/).

[35] Such as video, with video hosting and action tracking (http://newsroom.fb.com/news/2015/06/news-feed-fyi-taking-into-account-more-actions-on-videos/), app acquisitions like Instagram and WhatsApp, and with plugins to track activities outside of Facebook.

[36] *See* Google Products and Advertising Platforms (www.thinkwithgoogle.com/products/).

targeting knowledge available from its unique access to an increasingly complete and

computerized social network, including by tracking users beyond the Facebook.com website.

Consequently, the two activities, providing online social networking services and selling

advertising, are inextricably connected; the profit motive permeates both sides of the operation.

19.   Facebook competes for advertising expenditures, among other means, by

differentiating its platform from competitors' as the most effective because of the unique ability

to leverage the Social Graph, described in more detail below. Researchers in the field of social

and economic networks have noted specifically that they "…find evidence that social advertising

is effective, and that this efficacy seems to stem mainly from the ability of targeting based on

social networks to uncover similarly responsive consumers."[37] In practice, the superior

effectiveness of advertising on this basis is demonstrated by the increasing click-through rates

("CTR") of ads placed through Facebook as opposed to ads placed through Google's display

network.[38]

B.   The Social Graph

20.   The main way in which individual Facebook users knowingly connect with each

other is by selecting the "Friend" button to add them to their network. The main way users

knowingly interact with brands that have Facebook pages is to select the "Like" button so a

"fan"[39] link is created allowing the Facebook page's posts to appear on each fan's home page (on

the "news stream" of posts from friends and liked pages). Facebook also creates connections that

users may not be aware of. For example, beyond the Facebook.com website or applications, users'

browsing and other activities are also able to be logged using cookies,[40] pixels[41] and similar

---

[37] C. Tucker, "Social Advertising," February 15, 2012, SSRN (http://ssrn.com/abstract=1975897).

[38] Since mid-2014 Facebook CTRs have increased by 35% vis-à-vis a 25% increase on Google's
network, according to the latest "Digital Advertising Report Q3 2015", Adobe Digital Index
(www.cmo.com/adobe-digital-index.html), p.18.

[39] In Facebook marketing, while it is natural to speak of a "Friend" of a person, the equivalent for
brands is to use "Fan" instead, although they may also be used interchangeably.

[40] Cookies are small files that are stored on the user's device by the website or application being
used and some ads being viewed.

[41] Pixel tags in this context are also called clear GIFs, web beacons, or pixels and are small blocks
of code on a webpage or application that allow them to perform actions such as read and place
cookies and transmit information to Facebook or its partners.

internet technologies.[42] The resulting information is used in delivering targeted advertising and refining the information represented on the Social Graph.

21.   Facebook's Social Graph represents the integration of information collected by Facebook about Facebook users, and encompasses their location, demographics, interests, behaviors, and connections, in order to target advertising and marketing communications to specific groups of users identified by these attributes.[43]

22.   Figure 1 illustrates one hypothetical user on the social network (at the center), technically referred to as a "node." This user is connected to two friends by lines called "edges," has "Liked" a page (For the F8 Developers Conference, illustrated by its logo on the upper right corner), is interested in cooking (link labeled "cook"), has watched a video on Netflix (bottom right link), and has listened to music on Spotify (middle left link).

Figure 1
Facebook Social Graph Illustration[44]

---

[42] *See also* https://www.facebook.com/help/cookies/.

[43] Although the term is borrowed from Mathematics and Sociology, it was introduced in the Facebook context by Mark Zuckerberg during the 2007 F8 Developers Conference on May 24, 2007.

[44] From Business Insider (http://static3.businessinsider.com/image/4f5112e169bedd1526000061/facebook-open-graph.jpg).

REPORT OF FERNANDO TORRES IN SUPPORT OF
PLAINTIFFS' MOTION FOR CLASS CERTIFICATION;
C 13-05996 PJH (MEJ)

23.   Figure 1 is a partial visual representation of the Social Graph. In practice, the

information contained in the Social Graph is stored in a (complex and distributed) database. The

data model Facebook utilizes is called TAO (The Objects and Associations).[45] The constituent

parts of this model – illustrated above – are Objects (representing the "nodes," or data items, such

as a user or a location) and Associations (representing the "edges," or relationships between

Objects).

24.   Thus, as illustrated, even activities (accessing pages, clicking on Like or Share

buttons) performed on websites or applications outside of Facebook can, and are, represented in

the Social Graph. Granting controlled access and writing abilities to this wealth of information to

registered developers, on April 21, 2010, Facebook released the Open Graph Protocol,[46] which

enables any web page to become a rich object in a Social Graph, and the Graph API,[47] which is

the primary way for apps to read and write to the Facebook Social Graph.[48] Facebook builds and

maintains full access to the full Social Graph leveraging its own record of users' connections

behind-the-scenes.

C.   The Like Button

25.   Facebook social plugins, such as the "Like" Button, are lines of code that third-

party websites can integrate into their sites, which display a Facebook logo and execute the

programmed code when the page is accessed and/or a Facebook user clicks on it.[49] Facebook first

implemented the Like Button in or around February 2009[50] and, in Facebook's F8 conference in

---

[45] *See* https://www.facebook.com/notes/facebook-engineering/tao-the-power-of-the-graph/10151525983993920

[46] The Open Graph protocol is programming code used on Facebook to allow any web page to have the same functionality as any other object on Facebook. *See* Open Graph Protocol open source website (http://ogp.me/).

[47] API, or "Application Programming Interface," is the code that a third party may utilize to build software on top of Facebook's platform. Through Facebook's API, the third party product is able to utilize parts of Facebook's code (and access certain tranches of Facebook's data) for its functionality.

[48] *See* https://developers.facebook.com/docs/graph-api.

[49] Facebook SDK Documentation (https://developers.facebook.com/docs/javascript/quickstart/v2.5#plugins).

[50] J. Kincaid in: TechCrunch (http://techcrunch.com/2009/02/09/facebook-activates-like-button-friendfeed-tires-of-sincere-flattery/).

2010, it was opened up for third party developers for marketing and application development uses.[51]

26.   As illustrated in Figure 1 above, a Like becomes a Social Graph connection between a user and a Marketer that has installed a Facebook Social plug-in.[52] Generally speaking, "Liking" a "Page" means the user is connecting to that Page, and "Liking" in reference to a post from a friend, which means the user is letting that friend (or friend of a friend) know that the user "likes" his or her post (without leaving an explicit comment).[53] The first is a link between a user and a Marketer, the second is a link among users. The "Likes" recorded as a result of scanning private messages addressed in this case are of the first type.

27.   Facebook developed social plug-ins, such as the "Like" button to continue expanding its network by affiliating with Marketers or third party websites. Social plug-ins enable advertisers and Marketers to integrate user activity inside and outside of the Facebook website. The initial performance metric for these advertising activities was the number of "Likes" associated with a company within Facebook and, increasingly, outside of Facebook on Marketers' websites.

28.   Figure 2 below is an illustration from Facebook materials addressed to Marketers on the benefits of using social plugins.

---

[51] Facebook F8 April 21, 2010.
[52] Facebook, Social Plugins FAQs, at: https://developers.facebook.com/docs/plugins/faqs/#ref.
[53] *See* Facebook Help Center at: https://www.facebook.com/help/228578620490361.

REPORT OF FERNANDO TORRES IN SUPPORT OF
PLAINTIFFS' MOTION FOR CLASS CERTIFICATION;
C 13-05996 PJH (MEJ)

Figure 2
Benefits of Using Like Button Plugins
(Facebook Document FB000026793)

29.   Facebook is well aware of the power of the Like button to generate actionable

signals for advertisers.[54] From its launch in April 2010, the impact of Social Plugins was

significant, generating 815 million clicks on "Like" buttons daily in the first few weeks.[55]

30.   Facebook has promoted this social plug-in aggressively to third-party websites by,

for instance, taking control of News Feed content.[56] In turn, Marketers that wished to maintain

their reach via the social network had to respond by increasing the integration of Facebook into

their marketing strategies and budgets.[57]

D.   **The Alleged Violations**

31.   Facebook published a privacy policy and posted descriptions of Facebook's

private messaging service claiming it would provide a way to communicate privately and that the

messages would be private.[58]

---

[54] According to internal communications produced in discovery, for example, Facebook personnel sought marketing clients' cooperation to further promote the Like Button aiming "…to show the power of the Like button and how people are using it to determine what's popular." (FB000011746).

[55] According to Defendant's internal communications on May 8, 2010 (FB000011715-6).

[56] *See* Facebook Media, "An Update to News Feed: What it Means for Businesses" (https://www.facebook.com/business/news/update-to-facebook-news-feed) and "News Feed FYI: Balancing Content from Friends and Pages" (http://media.fb.com/2015/04/21/news-feed-fyi-balancing-content-from-friends-and-pages/).

[57] *See, e.g.*, MarketingLand (http://marketingland.com/facebooks-latest-tweaks-favor-friends-could-hurt-page-reach-125931).

[58] CAC, at §§21-24.

REPORT OF FERNANDO TORRES IN SUPPORT OF
PLAINTIFFS' MOTION FOR CLASS CERTIFICATION;
C 13-05996 PJH (MEJ)

32. The CAC alleges that Facebook actually scanned the content of private messages and used information concerning any URLs contained within the messages to artificially increase the appearance of user engagement with third-party websites by increasing the count on such sites' Like buttons, as well as for other, undisclosed, purposes.[59]

33. Additionally, and beyond the end of 2012, Facebook allegedly kept track of the information gleaned from users' shares of the URLs in at least two ways: in the aggregate, by noting the number of times that such URLs were shared by private messages, and individually, by logging the fact that an individual who shared a URL in a private message had done so.[60]

34. Consequently, in the context addressed in the background section, the following methodological discussion addresses two distinct aspects of how Facebook benefited from the accused actions:

    a. Benefits from the additional information that enhances the Social Graph as a means to increase advertising revenue and profits; and,

    b. Benefits from artificially increasing the "Like Count" on third party websites using Facebook social plugins,[61] because it enhances clients' impression of how effective Facebook Marketing is and incentivizes Marketers' willingness to invest in Facebook Marketing.

---

[59] URL stands for Uniform Resource Locator, the unique identifier of each document on the internet. Defined initially by Tim Berners-Lee in: "Uniform Resource Locators (URL): A Syntax for the Expression of Access Information of Objects on the Network" (March 1994) in: http://www.w3.org/Addressing/URL/url-spec.txt.

[60] CAC at §§25-26.

[61] At least up to the end of 2012.

IV. The Measure of Damages

A. Benefits Resulting from Enhancing the Social Graph by Incorporating Intercepted Data.

35.   As discussed below, the incremental value of Facebook's benefits from enhancing the Social Graph by including data intercepted in private messages can be calculated on a per URL link basis. This incremental profit from Facebook's accused behavior can be calculated by utilizing the corresponding inputs and the algorithm discussed in this section.

36.   It is not disputed that Facebook's Social Graph is a valuable asset. The value fundamentally arises from the aggregation of the collected information from all users in general, as well as from the information intercepted from the Class members' private messages. By its actions, Facebook has denied Class members the ability to restrict access to elements of information about them (URL links) and is profitably utilizing the information by enhancing the value of its own social media advertising platform, which helps Facebook maintain and grow its market share in the face of competition. Thus, by gathering data from Class members as alleged by Plaintiffs, Facebook directly benefits by enhancing the informational content and targeting power of their key revenue-generating asset: the Social Graph.

37.   The more nuanced the data and the inferences that can be drawn from it, the more effective Facebook marketing becomes and the greater the share of advertising revenue that the Company can extract. For example, in a recent Earnings Call Facebook's Chief Operating Officer, Sheryl Sandberg, highlighted an advertising campaign on Facebook in which the fast food chain Wendy's wanted to reach a very specific target group for the launch of a new product ("Jalapeño Fresco Spicy Chicken"): "millennials that are spicy food lovers". Wendy's worked with Facebook to create a campaign with five video ads specifically targeted at Facebook users that fit that socio-demographic (millennials) and affinities (spicy food lovers) profile. The targeting of the campaign, based on the information in the Social Graph, was successful in exceeding goals in terms of: (a) the impact of the ads, as significantly more consumers recalled seeing the ads; and (b) in terms of sales, with a significant increase in purchases among the target

segment.[62] The more precise the socio-demographic and affinities profile, the more successful

and, therefore, profitable, an advertising campaign can be. The value of the Social Graph asset is

significant. Working off of publicly-available information, this value can be ascertained as

follows, applying the generally recognized Income Approach to Valuation.[63]

38.   Under the Income Approach, the value of an asset is measured by the net present

value of the net economic benefit to be received over its economically useful life.[64] The three

essential factors of this measurement of value are: (1) the value of the net income stream

(revenue minus expenses) that can be generated by the asset; (2) an assumption as to the duration

of the net income stream; and (3) an assumption as to the risk associated with the realization of

the anticipated net income.[65] These factors can be determined mainly based on Facebook's

financials.

39.   Focusing on the Social Graph delimited as far as possible to the U.S., Facebook

has stated that, as of June 30, 2015, advertising revenue from the U.S. is in the order of $1,593

million per quarter.[66] This is revenue attributable to the Social Graph because it enables the

unique selling proposition of targeted advertising on Facebook. Furthermore, according to

Facebook, the average cost of revenue, marketing and sales, and general and administrative

expenses during the same period was 40.75% as a percentage of revenue.[67] Thus, a profit of

$3,776 million per year is attributable to the U.S. portion of the Social Graph asset.[68]

---

[62] Example discussed by Sheryl Sandberg (Facebook COO) during the 2015 Q2 earnings call held on July 29, 2015. Available at: http://investor.fb.com/results.cfm.

[63] *See, inter alia*, G.V. Smith and R.L. Parr, Valuation of Intellectual Property and Intangible Assets, John Wiley & Sons, 2000; R. F. Reilly and R.P. Schweihs, Valuing Intangible Assets, McGraw Hill, 1999.

[64] *See, e.g.*: Smith and Parr (2000), p. 164.

[65] *Ibid*, p. 169.

[66] This is the average of the quarterly advertising revenue from the activities of users located in the U.S. and Canada during the four quarters between April 2014 through June 2015, $1,771 million, as disclosed in: Facebook, Inc.'s 2015 Q2 Earnings Report (July 29, 2015) Slide 9 (*op cit.*). A further adjustment is made to exclude data for Canada, multiplying by the ratio of the size of the U.S. Population to the total of the two countries (89.96% = 321.37 / (321.37+35.85) per official U.S. Census and Statistics Canada sources (*op. cit.*).

[67] Facebook, Inc.'s 2015 Q2 Earnings Report (July 29, 2015) Slide 13 (op cit.). Per accepted valuation standards, Research and Development expenses are not includable in this valuation because, by definition, their effects are in the future, not as of the valuation date (June 30, 2015).

[68] The result of multiplying the quarterly revenue times four quarters and deducting 40.75% for

Footnote continued on next page

40.   The economically useful life of the asset in question, that is, the usefulness of the information represented in the Social Graph, is not immutable; people's locations, friends, affinities, and interests change over time. While the Social Graph contains a varied spectrum of information, as a proxy for the likely obsolescence of the information embodied in the Social Graph, the most significant indicator, in my opinion, is geographical mobility. One of the primary selection criteria in defining a target market is location; there is generally no point in advertising to users in locations where sales cannot be made, while other primary attributes tend not to change as often.[69]

41.   Geographical mobility is periodically measured by the U.S. Census. On average, in the span of five years, 35.4% of the population moves.[70] This represents an exponential decline in the accuracy of address information of 8.37% per year.[71] At this rate, 50% of people will have moved in about eight years.[72] In addition, considering the broader context of the valuation of comparable intangible assets for financial reporting, a marketing asset frequently identified in business mergers and acquisitions is the Customer List. The median remaining economic life of Customer Lists among publicly traded U.S. companies is also eight years.[73] Thus, while it is likely that a lot of the information on the Social Graph will still be current after eight years, a primary attribute and targeting selector (location) will not be accurate for the majority of people. Based on these considerations, I have concluded that a reasonably reliable remaining useful life for valuing the Social Graph asset is eight years.[74]

Footnote continued from previous page
expenses.

[69] These would be parameters such as age, gender, household income, which change predictably, slowly, sporadically, or not at all.

[70] U.S. Census Bureau, Geographical Mobility: 2005 to 2010 (December 2012), Table 2, Page 5 (http://www.census.gov/prod/2012pubs/p20-567.pdf).

[71] This equivalent annual rate is calculated algebraically solving the equation expressing the Census fact that the ratio of the population in year 5 relative to the population in year 0 is 64.6% (100% - 35.4%) and this is equal to $(1 + \text{annual rate})^5$.

[72] Technically, in 7.9 years, calculating: $\log(0.50) / \log(1 - 0.0837)$.

[73] Data from: Business Valuation Resources, "Benchmarking Identifiable Intangibles and Their Useful Lives in Business Combinations" BVR 2012, p. 66 (www.bvresources.com).

[74] This is a conservative position since, in reality, Facebook users tend to maintain their information current as part of the normal use of the network. The asset is being valued "as is" in mid-2015, without considering continued updating.

42.   A reasonable estimate of the corresponding market discount rate for this asset can be based on the most current assessment of the risk factors recommended by the most reputable industry sources.[75] The discount rate is made up of a series of components reflecting the time-value of money (the so-called Risk Free rate[76]), the general additional risk of equity returns (known as the Equity Risk Premium[77]), the additional variations of net income in the relevant industry (the Industry Risk Premium), and the incremental risks unique to the asset class. Thus I considered the risk-free rate of 4.0%,[78] a market equity risk premium of 5.0%,[79] as well as an advertising industry risk premium of 3.66% based on generally accepted data sources.[80] In addition, I considered a risk premium reflecting the incremental risks associated with intangible assets relative to financial and tangible business assets of 6.0%.[81] Adding together these various components, I thus arrived at the discount rate for the Social Graph asset of 18.66%.[82]

43.   Consequently, applying the aforementioned method and inputs, which are the type of methods and parameters applied by valuation professionals like myself, the (U.S.) Social Graph asset relating to the U.S.is valued at approximately $15 billion, as illustrated in the following table:

---

[75] Duff & Phelps, 2015 Valuation Handbook: Guide to the Cost of Capital, John Wiley & Sons, 2015

[76] In valuation theory, this rate is the return available on a security that the market generally regards as free of the risk of default. In practice, in the U.S., this is the yield on government securities, adjusted (or *normalized*) to remove the distortion of the artificially depressed, unsustainable rates during the 2008 financial crisis. [Duff & Phelps (2015), Ch. 3].

[77] Conceptually, this premium is defined as the extra return, over the expected yield of risk-free securities, which investors expect to receive from an investment in the market portfolio of common stocks (Duff & Phelps 2015, pp. 3-17).

[78] Technically, this rate is the normalized 20-year U.S. Treasury yield [Duff & Phelps (2015), Ch. 3].

[79] This is the considered *forward* equity risk premium recommended by Duff & Phelps.

[80] See, Duff & Phelps (2015), pp 3-35 and 5-21 (The industry risk premium corresponds to a Beta of 1.73). In addition, some valuation models consider a specific "Size Premium" which, in this case, is not necessary since the Facebook Social Graph is evidently the largest marketing database in the economy.

[81] As recommended by IPmetrics for intellectual property (IP) valuation analyses based on market interest rate spreads for IP-backed securities (*See, e.g.*, M. Loumioti, "The use of intangible assets as loan collateral" Harvard Business School, 2011 Available at the Social Science Research Network: http://ssrn.com/abstract=1748675).

[82] This is the result of adding the risk-free rate and the three identified risk premiums corresponding to equity, industry, and asset considerations (18.66 = 4 + 5 + 3.66 + 6).

Table 1
U.S. Social Graph Valuation
(As of 2015 Q2)

Year	Annual Profit ($ millions)	Discount Factor (at 18.66%)	Discounted Value ($ millions)
1	$ 3,776	0.84274	$ 3,182
2	3,776	0.71022	2,682
3	3,776	0.59853	2,260
4	3,776	0.50441	1,905
5	3,776	0.42509	1,605
6	3,776	0.35824	1,353
7	3,776	0.30190	1,140
8	3,776	0.25443	961
		Total Value:	**$ 15,087**

44.   Since Facebook already has the infrastructure and software development platform in place to develop and grow the Social Graph, as well as access to the marketing clients that fund the advertising campaigns, the additional information collected through the accused activities has arguably zero incremental cost. Therefore, from an economic perspective, virtually all of the incremental advertising revenue generated from the enhancement can justifiably be considered incremental profit to Facebook. Therefore, the impact of additional information intercepted from private messages on Facebook's revenue flows directly to the bottom line (profits).

45.   With the relevant quantitative information, I would estimate the value of the enhancement to the Social Graph as commensurate with the ratio of (1) intercepted URLs in private messages during the Class period to (2) the total number of links on the Social Graph.

46.   Absent specific Facebook network data,[83] from public information it can be ascertained that during 2010, Facebook had an average of 127.1 million monthly active users in the U.S.[84] On average, within Facebook as a whole, the average monthly active user sent nearly

---

[83] From the document production, I found that around April of 2012, an internal Facebook report identified around 600 million monthly active users of the messenger service (*see* FB000008271). My estimate, as shown on the table calls for a number between 687 and 751 million.

[84] According to Facebook Inc.'s Form 10-K Disclosures, The four quarters of 2010 in the U.S. & Canada had MAUs of 130,137,144, and 154 million respectively. The average cited is adjusted to exclude users in Canada.

43 messages per month.[85] Thus, in 2010, I estimate that the U.S. user base sent approximately 65.4 billion messages.[86] The following Table shows the results of these estimates on an annual basis.

Table 2
U.S. Messaging Activity
(2010 – 2015)

Year	Monthly Average Users (millions)	Estimated Messages (millions)
2010	127	65,353
2011	155	79,464
2012	169	86,867
2013	178	91,725
2014	184	94,848
2015H1	190	97,855

47.   Since user engagement has increased over the Class Period,[87] the estimates on Table 2 may well understate the amount of messaging activity on the network.

48.   The relative impact of this additional, but allegedly wrongfully obtained information, on the value of the Social Graph can in principle be ascertained as the addition of information to the Social Graph. In the absence of detailed information about it, I have relied on public information to approximate the optimal analysis.

49.   Facebook researchers have published results of the formal characterization of the entire social network of active members[88] of Facebook in May 2011, comprising 721 million

[85] Considering Facebook's disclosure in connection with the redesign of the Messenger platform, stating that 350 million MAUs sent 15 billion messages per month, or an average of 42.857 messages per MAU/month, at: https://www.facebook.com/notes/facebook-engineering/the-underlying-technology-of-messages/454991608919.

[86] This is the result of multiplying 42.857 messages/user/month times the 127.07 million users, times 12 months.

[87] According to Facebook, between August 2012 and May 2013 user engagement, as illustrated in the number of likes generated per day, increased from 2.7 Billion to 4.5 billion on average (https://www.facebook.com/photo.php?fbid=10151908376831729&set=a.10151908376636729.1073741825.20531316728&type=1&theater).

[88] Defined for analysis as "the number of members that logged into the site in the 28 days before the May 2011 date of the study and had, at least, one Facebook friend." *See, e.g.*: J. Ugander, B. Karrer, L. Backstrom, C. Marlow, "The Anatomy of the Facebook Social Graph", White Paper,

Footnote continued on next page

active users.[89] From this universe, 149 million are U.S. Facebook users.[90] Among these U.S. social network users, there were 15.9 billion friendship links or graph "edges," and the average U.S. user had around 214 Facebook friends.[91] The graph is highly connected, in the sense that typical Facebook members are linked (as "friends" and "friends of friends") in such a way with the rest of the network as to be able to reach the vast majority of individuals with only a few "hops" or jumps from one friend to another. Specifically, in the U.S. network the average distance between people was found to be 4.3 friends and, furthermore, 96% of all Facebook members were within 5 degrees of separation.[92]

50.   This high degree of "connectedness" is one aspect of the Social Graph that makes it attractive for advertisers and why recommendations from Facebook Friends can be so effective; properly targeted, relatively few recommendations can reach virtually the whole potential market. Moreover, with interests, brand pages, and other actions, the Social Graph now includes more data points ("nodes") and links ("edges") than just Facebook Friends. It is the targeting, and specifically the granularity and breath of the targeting information that is enhanced by additional user–URL links, which Facebook gathered unlawfully from intercepting and scanning private messages.

51.   Therefore, the economic value of the benefits Facebook derives from the unlawfully gathered user–URL links is proportional to the impact of this additional information on the total information on the Social Graph. In principle, the benefit to Facebook in this respect would be measured by attributing the corresponding portion of the incremental value of the Social Graph to the accretion of the unlawfully gathered links.

52.   In other words, at a point in time (t), the value of the Social Graph to Facebook can be expressed as the product of the number of links (L) in the Graph times the value, or worth, of a link (w):

Footnote continued from previous page
18 Nov. 2011, Cornell University (http://arxiv.org/abs/1111.4503v1), p. 2.
[89] *Id.* at p. 14.
[90] This is nearly 60% of the eligible U.S. population at the time, *see* Ugander, et al. (2011) p. 2.
[91] Ugander, et al. (2011) p. 2.
[92] Ugander, et al. (2011) p. 5.

$$V_t = L_t \times w_t$$

At the next period (t+1), the value is:

$$V_{t+1} = L_{t+1} \times w_{t+1}$$

The change in value to Facebook, the incremental benefit, is then:

$$\Delta V = V_{t+1} - V_t = L_{t+1} \times w_{t+1} - L_t \times w_t \; .$$

53. Adding and subtracting the value of today's links at yesterday's unit value ($L_{t+1} \times w_t$):

$$\Delta V = L_{t+1} \times w_{t+1} - L_t \times w_t \; + L_{t+1} \times w_t - L_{t+1} \times w_t$$

and re-grouping the components of this equation, we have:

$$\Delta V = L_{t+1} \, (w_{t+1} - w_t \,) + (L_{t+1} - L_t \,) \, w_t$$

54. Thus, this equation can be interpreted as stating that: The incremental benefit to Facebook is the sum of the effect of the change in the value of a link, plus the effect of the change in the number of links. Only the second component is directly attributable the capture of additional links, so that the measure of damages (D), with full information, would be calculated as follows, considering only the unlawfully gathered additional links:

$$D = (L_{t+1} - L_t \,) \, w_t$$

55. The calculation of the total value is straightforward; multiplying the corresponding link value to obtain the incremental benefit to Facebook.

56. The economic benefit to Facebook from the intercepted links can then be estimated applying the *per link* values, *i.e.* w_t, to the incremental number of links attributable to the intercepted messages, *i.e.* $(L_{t+1} - L_t \,)$.

57. With the input of the number of intercepted URLs, this value per link estimate can be applied to determine the total benefit to the defendant.

58. All Class members are subject to the accused scanning and, in this sense, are injured in the same manner, while Facebook benefits from the aggregate information intercepted out of all the messages.

59. Facebook benefits from advertising revenue from adding the user-URL links into their targeting platform and from enhancing their understanding of how and what users share

links to. The benefit is defined not only by the potential act of generating additional revenue from targeting ads to the senders of intercepted messages, but also by the additional use in better targeting these and similar users (in marketing terms); and the benefit is ultimately proportional to the amount of information intercepted from private messages.

60.   Therefore, it is my opinion that a proper attribution of damages among Plaintiff Class Members, calculated as benefits received by the Defendant, should be based on the number of links (URLs) intercepted.

B.   Benefits from Inflating the Like Count on Third Party Websites

61.   According to the CAC, Facebook also benefits from using the information obtained from the intercepted messages by increasing the counter associated with the "Like" button on third party websites.[93] Independently of the actual advertising revenue as analyzed in the previous section, Facebook benefits by providing additional perceived value to all Marketers using these counters to evaluate the effectiveness of Facebook marketing. Due to the wrongful capture of links, and exacerbated by the double counting, Facebook marketing appeared more effective to Marketers and, in turn, Facebook's clients were induced to extend their relationship with Facebook, not simply by increasing advertising budgets, but at least in part by investing more in building Facebook Pages and installing a variety of plugins feeding additional information for Facebook's targeting and marketing purposes.

62.   As explained in this section, the economic benefit derived by Facebook attributable to one specific way in which it has used the information obtained from the Class Members messages to increase the "Like" count on its clients' websites lies between two bounds: a higher bound represented by the cost that client websites saved by not having to acquire additional "Likes" calculated at a dollar amount "Y" per "Like"; and a lower bound determined by the market value of artificially acquired "Likes" for pages made possible by manipulating the counting system, of a different dollar amount "Z" per "Like." This amount represents a cost savings or benefit Facebook was able to provide to its clients directly as a result of the breach of privacy of messages and identifying URLs of Facebook Marketers. Facebook thus benefits from

[93] CAC at §27 and 39.

1 the higher usage rates from Marketers incentivized by the higher Return of Investment (ROI) of

2 the advertising expenditures through the Facebook platform.

3   63.   Marketers are interested in increasing the number of "Likes" associated with their

4 use of the social plugins on their websites outside of Facebook, not simply in growing the number

5 of "Likes" on their Facebook pages.

6   64.   The importance of Marketers' website counters being affected by the alleged

7 unlawful actions in this case resides in the fact that, during the Class period, it was a key

8 performance indicator of the marketing function for Facebook's clients: the Marketers or

9 advertisers on whose websites it was shown. Advertisers, as businesses, are interested in the

10 return on their expenditures in advertising; the conventional ROI which compares gains from

11 advertisements with their cost. While the cost is relatively straightforward to ascertain, in the

12 digital advertising environment, gains from advertising are susceptible to estimation in a variety

13 of ways, such as by the number of visitors to a web page, the number of incoming links, the

14 activity on social networks (*e.g.*, followers, comments, "retweets" or "shares," references in

15 relevant blogs, views on social media web sites, RSS feed subscribers, among others).[94] In the

16 Facebook environment, the number of Likes measured is typically interpreted as an indicator of

17 the reach of an advertising strategy and, given the particular brand/product combination, as a

18 factor in generating sales.[95]

19   65.   For this analysis, the general principles applied in identifying market valuations of

20 the economic worth of "acquiring" or "attracting" Facebook users to express their affinity for a

21 brand are consistent with the general Cost Approach to valuation; the measurement of value by

22 reference to the amount of money that would be required to replace the functionality of the

23

24 [94] See, for example, Perdue, D. J. (2010). Social media marketing: Gaining a competitive
    advantage by reaching the masses. Social Media Marketing, pp. 1, 3–36.
25 [95] By definition, Sales can be seen as the product of marketing reach, times the impact of the ad
    (leads per ad), times the yield (sales per lead). Thus, with a given degree of impact and yield, a
26 higher reach, measured by the Like count for example, generates higher sales. *See, e.g.*: D.
    Buhalis and E. Mamalakis, "Social Media Return on Investment and Performance Evaluation in
27 the Hotel Industry Context," in: I. Tussyadiah, A. Inversini (eds.), Information and
    Communication Technologies in Tourism 2015, DOI 10.1007/978-3-319-14343-9_18, pp. 241-
28 253.

subject asset (the Like).[96] Ultimately, the realized value of a specific set of "Likes" would

generally exceed the cost, to a degree depending on the effectiveness of the specific marketing

strategies implemented to leverage them in practice.

66.   The effectiveness of the then-novel social network advertising campaigns was

typically measured by the number of Likes.[97] Knowledge of the mechanics of this "Like" counter

obviously led to manipulations, such the "purchase" of spurious "likes,"[98] which, at least in one

instance, had a market value as low as $0.075 per "like" and even deceptive campaigns that

encouraged people to copy and paste in their public Facebook posts certain texts with the

appropriate URLs embedded in them, so the Facebook mechanism would reward the intended

website with a viral increase of "Likes."[99]

67.   Ultimately, the meaning of the counter became so diluted by 2013 that both

analytics firms and Facebook changed their assessment of the counter as well as the need for the

button graphic, developing the Facebook pixel and other hidden plug-ins, and began

supplementing these performance measures with other factors.[100]

---

[96] The underlying assumption is that the price of new assets (*i.e.*, Likes) is commensurate with the economic value of service that the property can provide during its life. See: G.V. Smith and R.L. Parr, Valuation of Intellectual Property and Intangible Assets, John Wiley & Sons, 2000, p. 164.

[97] Advertising generally strives for the general notion of Reach ("the number or percentage of target audience members exposed at least once to media carrying an advertising message"). In the online environment, user activity can be measured in great detail and the number of clicks on a specifically-designed button, or other specific user action (including a link or URL), as reflected in the Like count provide that measurement.

[98] *See, e.g.*, National Public Radio, Planet Money "For $75, This Guy Will Sell You 1,000 Facebook 'Likes'" originally broadcast on May 16, 2012(http://www.npr.org/sections/money/2012/05/16/152736671/this-guy-will-sell-you-sell-you-1-000-facebook-likes).

[99] Some hoaxes that repeatedly play out in the Facebook context are similar to a "chain letter" model where users are encouraged to "copy and post" texts such as bogus "copyright" notifications and spurious claims of privacy claims based on international law. *See, e.g.*, W. Oremus, "That Facebook Copyright Notice Is Still a Hoax" November 26, 2012, Slate (http://www.slate.com/blogs/future_tense/2012/11/26/facebook_copyright_notice_berner_convention_status_update_still_a_hoax.html).

[100] Nielsen, the company behind the Ratings system, now emphasizes the notion of 'Brand Lift' to measure the effectiveness of online marketing and, specifically, through Facebook (Nielsen "Quickly and Accurately Measure the Effectiveness of Your Online Ad Campaigns" available as: www.nielsen.com/content/dam/nielsen/en_us/documents/pdf/Fact%20Sheets/Nielsen%20BrandLift.pdf).

68.   Therefore, Facebook benefited from the accused practice of using the results of scanning supposedly private messages for URLs and affecting Like counts because this practice gave its clients, Marketers, an incremental impression of effectiveness of their Facebook marketing campaigns. Marketers perceiving an incremental return of their spending on Facebook campaigns were undoubtedly encouraged to allocate additional funds to these campaigns.

69.   Due to the success of social online networking, acquiring Likes on Facebook pages and outside websites has become a fundamental goal for brands in all Business-to-Consumer markets over the past decade. In studies aimed at estimating the costs of acquiring fans, advertising industry experts have based their analysis on the average of paid advertising needed, on average, to acquire a Facebook page "Like" and convert them into paying customers. In 2011, a study quoted in the well-known trade publication Advertising Age,[101] considered 5 million Facebook ads placed by over 50 companies, the acquisition cost of "Fans,"[102] calculated by dividing the total cost of clicks by the total number of actions, was found to be $9.56 less than the cost to acquire the same level of sales from non-Fans.[103] This is an average of the sampled companies from mostly the consumer packaged goods, auto and finance. Necessarily, the cost per acquisition varies by industry, by product, as well as by the desired behavior from potential customers when visiting the Facebook page. Table 3 shows the average effect summarizing the findings, comparing the cost of attracting a variety of actions (called "conversion" events) between Facebook users that previously "Liked" the corresponding brand, *i.e.*, Fans, and visitors that had not, *i.e.*, Non-Fans.

---

[101] Advertising Age, Nov. 22, 2011.

[102] "Fans" standing for Facebook Friends on Brand Pages, is the term typically used in advertising industry. See, *inter alia*, Peter Elbaor, "The Interconnection of Facebook Fan Pages" October 28, 2011, ComScore Insights Blog, (http://www.comscore.com/Insights/Blog/The-Interconnection-of-Facebook-Fan-Pages).

[103] Study by SocialCode, LLC reported in trade publication Advertising Age (adage.com/print/231128).

Table 3
Cost per Acquisition (CPA) on Facebook
Source: SocialCode, LLC
(May-Sept 2011)

Conversion Type	Non-Fan CPA	Fan CPA	Difference
App Install	$8.49	$ 2.61	$5.88
Contest Submission	76.25	17.21	59.04
Contest Voting	21.09	3.26	17.83
Fan Acquisition	5.17	3.39	1.78
Program Sign-Up	75.90	41.25	34.65
Purchase	43.86	12.88	30.98
Sweepstakes Entry	5.81	2.57	3.24
TOTAL	**$ 14.93**	**$ 5.37**	**$9.56**

70. Since Likes can be profitable, as a result of those cost savings, a large number of companies implement marketing strategies to acquire them. Another study found that the average cost of advertising on Facebook to encourage a user to become a Fan – "Like" the advertiser's Facebook page – was $1.07.[104] This cost also varies across sectors and over time. In 2012, the cost per acquired Fan (*i.e.*, cost per click in Fan acquisition campaigns) averaged $0.55.[105] These costs are leveraged through targeting via the Social Graph as brands can gain seven times greater CTR by targeting Fans with ads which keeps cost per click at a minimum.[106]

71. Therefore, the direct incremental impact of the accused practice on Facebook is to increase advertising revenue, in the form of cost savings to advertisers from the accrual of Likes from the intercepted private messages.

---

[104] Webtrends, White Paper, 2011. Reported in The Wall Street Journal, "How Much Does a Facebook Fan Cost?" February 1, 2011.
[105] Based on data in WebTrends®, "Ads for Fans", 2012, p. 4.
[106] *Ibid*, p. 2.

72.   Since the benefits to Facebook are directly tied to the interception of URLs of Class Members' private messages, a proper allocation of damages per Class Member is calculated applying the value of each inflated Like count multiplied by the number of each Class Members' intercepted URLs.

73.   The amounts identified in this analysis – the cost savings to advertisers from the accrual of Likes from the intercepted messages – were, in principle, made available to spend on additional Facebook marketing campaigns. This would have been particularly true in light of the false appearance of increase Fan engagement that an inflated Like count would present. To that extent, a fraction of this benefit may have been converted to advertising revenue benefiting Facebook, overlapping enhanced value of the Social Graph addressed in the prior section.

74.   With quantitative data on the number of affected "Like" counts, and identification of the affected URLs, it will be feasible to narrow the ranges discussed here and calculate more precisely the potential incremental benefit attributable to the accused practice. Moreover, the calculated effect from incremental advertising revenue during the time when the Like counters were being affected (through December 2012), which would result from the analysis in this section, shall be deducted from the benefits calculated for this period under the methodology described in the previous section for affected Class Members.

Dated: November 13, 2015

_____

Fernando Torres

EXHIBIT A

FERNANDO TORRES, MSc
CHIEF ECONOMIST
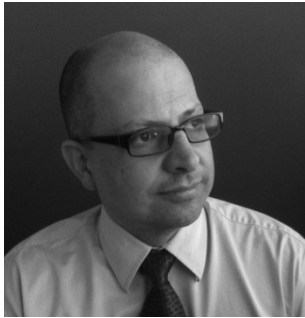
Fernando Torres is an intellectual property economist with nearly 30 years of work experience in economics, financial analysis, and business management in the U.S. and Mexico. He is a member and Chief Economist at IPmetrics LLC, an IP consulting firm specializing in the strategic analysis, valuation, and expert witness assessment of the full spectrum of intangible assets.

Since 2004, Mr. Torres has applied his economics, finance and business experience, as well as skills in quantitative techniques, to the analysis and valuation of intangible assets, including valuation for transactional and litigation purposes (bankruptcy and infringement cases). Prior to joining IPmetrics, Mr. Torres served as Senior Economist at CONSOR® Intellectual Asset Management.

During recent years, Mr. Torres has undertaken projects involving the valuation and/or the assessment of infringement damages regarding copyrights, trademarks, patents, trade secrets, rights of publicity, and other intellectual assets in such industries as commercial agriculture, auto parts, apparel and footwear, retail, pharmaceuticals, entertainment, telecommunications, social media, as well as non-profit organizations, among others.

Mr. Torres regularly presents on topics related to intangible asset valuation in a variety of venues, many of which qualify for CLE credit. During the past few years, Mr. Torres has been an instructor for the course "Valuing Intangible Assets for Litigation," which is part of the requirements of the Certified Forensic Financial Analyst designation issued by the National Association of Certified Valuation Analysts (NACVA).

Mr. Torres has been active in the area of the copyrights, privacy and rights of publicity infringement issues, encompassing from the unlicensed use of celebrity images to class action lawsuits involving the major social networking and web services companies.

 Mr. Torres is also the editor and author of the online "Patent Value Guide" and his perspectives on the value of patents and other intellectual property assets have been cited in the media, including Managing Intellectual Property, The New York Times, Forbes.com, Business News Network, Business Valuation Resources, and The Democrat & Chronicle.

Mr. Torres is a member of the National Association of Forensic Economics, and of the Western Economics Association International, among others. His career has spanned from academia, to branches of government, to private industry and consulting.

He first earned a B.A. in Economics from the Metropolitan University in Mexico City (1980), and went on to earn a Graduate Diploma in Economics from the University of East Anglia (U. K., 1981), and a Master of Science Degree specializing in Econometrics from the University of London, England (1982).

Prior to specializing in IP, his career centered on financial analysis and management in the private sector, having been both a brand development consultant and an entrepreneur in several business ventures, mainly in the software development and health care industries. During the 1980s, Mr. Torres was Professor of Economics at the Metropolitan University in Mexico City, teaching Economic Policy, Economic Growth, Microeconomics, and Quantitative Methods. Mr. Torres was later a financial consultant (NASD Series 7, 63, 65) for half a dozen years with AXA Advisors LLC.

PROFESSIONAL ASSOCIATIONS

- National Association of Forensic Economics
- Western Economics Association International
- American Economic Association
- International Trademark Association

PUBLICATIONS

- "Why only some patents are valuable" in: IPmetrics Blog, (May 13, 2015).

- "General Principle I – Lack of Intrinsic Value" in: PatentValueGuide.com, (February 11, 2013).

- "General Principle II – Patent Use is Key to Value" in: PatentValueGuide.com, (February 8, 2013).

- "Conceptual Patent Value Framework" in: PatentValueGuide.com, (January 31, 2013).

- "The Impact of Reorganization on Trademark Values," in: IP Management and Valuation Reporter, March 2012, BVR, Portland, OR.

- "Fundamental Principles of Patent Value," in: IP Management and Valuation Reporter, January 2012, BVR, Portland, OR.

- "Key Factors of Infringement Damages Apportionment in the Java & Android Case" in: IPmetrics Blog, (December 8, 2011).

- Book Chapter: "Valuation, Monetization, and Disposition in Bankruptcy" in *IP Operations and Implementation for the 21st Century Corporation,* John Wiley and Sons, Inc. (November, 2011).

- "Have Patent Litigation Damages Awards Been Worth It?" in: IPmetrics Blog, (April 29, 2011).

- "Celebrity Advertising and Endorsement" in: IPmetrics Blog, (March 2, 2011).

- "The Patent to Trademark Value Transition: Nespresso" IPmetrics Blog, (February 3, 2011).

- "The Liquidation Value of IP" in: <u>IPmetrics Blog</u>, (January 26, 2011).

- "An Econometric Model of Trademark Values" in: <u>IPmetrics Blog</u>, (January 25, 2011).

- Chapter 15: "Copyrights" in <u>Wiley Guide to Fair Value Under IFRS</u>, John Wiley and Sons, Inc. (May, 2010).

- "The Road to Asia," Feature Article (co-author) in: <u>World Trademark Review</u>, No. 23, February/March 2010, pp. 19-22.

- "Trademark Values in Corporate Restructuring" (July, 2007). <u>Social Sciences Research Network</u>: http://ssrn.com/abstract=1014741

- "Establishing Licensing Rates Through Options" (September, 2006) <u>Social Sciences Research Network</u>: http://ssrn.com/abstract=1014743 and in: http://formulatorres.blogspot.com/2006_05_01_archive.html

- Book Chapter: "Ch. 9: Recent developments in Patent Valuation" in: Practicing Law Institute, <u>Patent Law Institute 2007: the Impact of Recent Developments on Your Practice</u>, PLI Course Handbook (March 19, 2007).

- "Establishing Licensing Rates through Options," in: <u>ipFrontline</u>, September 12, 2006 (http://www.ipfrontline.com/depts/article.asp?id=12586&deptid=3).

COURSES AND PRESENTATIONS

- "What is a Brand Worth?" MCLE webinar, The State Bar of California, Trademark Interest Group, March 2015.

- "Intellectual Property Valuation Techniques," MCLE presentation for Pillsbury Winthrop Shaw Pittman, San Diego, CA, August 2014.

- "10 Common Mistakes in IP Valuation/Damages", CLE presentation to Jeffer Mangels Butler & Mitchell LLP, Los Angeles, CA, July 2014.

- "Intellectual Property Valuation Techniques," MCLE presentation, San Diego, CA, April 2013

- "Intellectual Property Valuation and Monetization," a seminar for the Special American Business Internship Training (SABIT) Intellectual Property Rights program, U.S. Department of Commerce. March, 2013.

- "Valuing IP in the Context of Bankruptcy," webinar for the Certified Patent Valuation Analyst curriculum, Business Development Academy. October, 2011.

- "Recent Developments in Intellectual Property Economic Damages," Presentation at the Annual Conference of the National Association of Forensic Economics. June, 2011.

- "Valuing the Intangible: Where to Start?" CLE presentation to Sheppard Mullin Richter & Hampton, LLP. December, 2009.

- "Defending and Enforcing Your Technology." Panelist at: Foley's Emerging Technologies Conference: Navigating a New World – San Diego, CA (Foley & Lardner LLP); September 2009.

- "Intellectual Property Valuation, Monetization and Disposition in Bankruptcy" – CLE presentation at the Spring Trademark Program of the NY Intellectual Property Law Association – New York, NY; June 2009.

- "Damages Valuation and Expert Witnesses" (co-presenter) – CLE presentations to:

  - Gibson, Dunn & Crutcher LLP – Irvine, CA (June, 2008)
  - Arent Fox, LLP — Washington, DC   (April, 2008)
  - Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P. – Washington, DC (April, 2008)

- "Valuing Intangible Assets for Litigation" (Instructor) – National Association of Certified Valuation Analysts (NACVA) – Fort Lauderdale, FL; December 2007

- "Valuing Intangible Assets for Litigation" (Instructor) – National Association of Certified Valuation Analysts (NACVA) – Philadelphia, PA; October 2007

- "Trademark Values in Corporate Restructuring" – Western Economics Association International 82nd Annual Conference – Seattle, WA; July, 2007

- "Entrepreneurship and Innovation" (Session Chair) – Western Economics Association International 82nd Annual Conference – Seattle, WA; July, 2007

- "Alternative Focuses for 'But For' Scenario Specification in Commercial Litigation" (Discussant) – National Association of Forensic Economics, Western Conference – Seattle, WA; June, 2007

- "Patent Values in the Evolving I.P. Market" – Practicing Law Institute – Hot Topic Briefing Teleconference; May 2007 (CLE Presentation)

- "Key Issues in Intellectual Property Due Diligence" – Due Diligence Symposium 2007 – ACG – Iselin, NJ; April 2007

- "Life Sciences IP Due Diligence" – American Conference Institute – San Francisco, CA; January 2007

- "Developments in Patent Valuation" – Practicing Law Institute – San Francisco, CA; January 2007 (CLE Presentation)

- "Collins & Aikman Europe and Other Cross-Border Asset Sales: A Tale of Two Venues" – American Bankruptcy Institute, Winter Leadership Meeting – Phoenix, AZ; December 2006

- "Valuing Intangible Assets for Litigation" (Instructor) – National Association of Certified Valuation Analysts (NACVA) – San Diego, CA; December 2006.

IPmetrics®
Intellectual Property Consulting

LITIGATION-RELATED EXPERIENCE

(Last Four Years)

Date Range	Parties	Case No.	Court	Status	Nature	Hired by	Involvement
February 2012	*The Int'l. Aloe Science Council Inc. V. Fruit of the Earth, Inc.*	*11-CV-2255*	United States District Court District of Maryland	*Settled*	Trademark Infringe-ment.	*Kane Kessler, P.C.*	Expert Rebuttal Report on Damages, Depositions
March 2012	*A. Fraley, et al v. Facebook, Inc.*	*11-CV-1726*	United States District Court Northern District of California	*Settled*	Rights of Publicity Class Action	*The Arns Law Firm*	Expert Declarations in Support of Motion for Class Certification, Value of Injunctive Relief, Deposition
August 2013	*Jude Law v. Paloform Inc.*	*SC120354*	Superior Court of the State of California (Los Angeles)	*Closed*	Rights of Publicity	*Wilson Elser Moskowitz Edelman & Dicker LLP*	Preliminary Expert Damages Report, Arbitration
September - November 2013	*Scidera, Inc. v. Newsham Choice Genetics, LLC*	*AAA 16-174-00582-12*	American Arbitration Association	*Closed*	Contract, Database	*Neymaster Goode, PC*	Expert Damages Rebuttal Report, Deposition, Arbitration
February 2014	*Lambert Corp. v. LBJC, Inc.et al.*	*13-CV-0778*	United States District Court Central District of California	*Settled*	Copyright & Trademark Infringe-ment	*Ezra Brutzkus Gubner LLP*	Expert Damages Report, Deposition
April 2014	*S. Mattocks v. Black Entertainment Television LLC*	*13-CV-61582*	United States District Court Southern District of Florida	*Closed*	Intangible Asset Fair Market Value	*Tripp Scott PA*	Declaration, Expert Damages Report, Deposition
July – Aug. 2014	*Tierra Intelectual Borinquen, Inc. v. Toshiba Corporation.*	13-cv-47	United States District Court Eastern District of Texas	*Settled*	Patent Infringe-ment	Ferraiuoli, LLC	Expert Damages Report, Deposition
Aug. 2014- Aug. 2015	*S. Abu-Lughod v.* S. Calis, Tocali, Inc., ASCII Media, Inc., et al.	13-cv-2792	United States District Court Central District of California	*Closed*	Contract, Software IP value	Kalbian Hagerty LLP	Expert Rebuttal Reports, Depositions, Trial testimony

Date Range	Parties	Case No.	Court	Status	Nature	Hired by	Involvement
Feb – Mar 2015	**S. Nerayoff** *vs. L. Rokhsar*	203157-2012	Supreme Court Of The State Of New York	*Closed*	Value of Patent Assets	Baker & Hostetler LLP	Expert Declaration on Patent Value, Trial testimony
Jan. - May 2015	*In Re Google, Inc.,* **Privacy Policy Litigation**.	12-cv-1382	United States District Court Northern District of California	*Closed*	Breach of Contract Class Action	Grant & Eisenhofer P.A.	Expert Report on Privacy Damages, Deposition

EXHIBIT B

<u>Exhibit B - List of Materials Relied On:</u>

I relied on the following documents and materials in forming my opinions:

Academic Literature

1. Vogel, Harold L. *Entertainment Industry Economics*. Cambridge University Press, 2011..

2. Smith, Gordon V., and Russell L. Parr. *Valuation of intellectual property and intangible assets*. Vol. 13. Wiley, 2000.

3. Reilly, Robert F., and Robert P. Schweihs. *Valuing intangible assets*. McGraw Hill Professional, 1998.

4. Business Valuation Resources, "Benchmarking Identifiable Intangibles and Their Useful Lives in Business Combinations" 2012, p. 66 (www.bvresources.com).

5. Duff & Phelps, 2015 Valuation Handbook: Guide to the Cost of Capital, John Wiley & Sons, 2015

6. Loumioti, Maria. "The use of intangible assets as loan collateral." Harvard Business School Job Market Paper (2011)., (http://ssrn.com/abstract=1748675)

7. Ugander, Johan, Brian Karrer, Lars Backstrom, and Cameron Marlow. "The anatomy of the facebook social graph." arXiv preprint arXiv:1111.4503 (2011). (http://arxiv.org/abs/1111.4503v1)

8. Perdue, David J. "Social media marketing: Gaining a competitive advantage by reaching the masses." Senior Honors Papers (2010): 127.

9. Buhalis, Dimitrios, and Emmanouil Mamalakis. "Social media return on investment and performance evaluation in the hotel industry context." In Information and Communication Technologies in Tourism 2015, pp. 241-253. Springer International Publishing, 2015.

10. Goldfarb, Avi, and Catherine Tucker. "Shifts in privacy concerns." Available at SSRN 1976321 (2011). (http://ssrn.com/abstract=1976321)

11. Tucker, Catherine. "Social advertising." Available at SSRN 1975897 (2012). (http://ssrn.com/abstract=1975897)

12. Tucker, Social Networks, Personalized Advertising, and Perceptions of Privacy Control, Time Warner Research Program on Digital Communications, Summer 2011 (http://209.59.135.49/pdf/TWC_Tucker_v3a.pdf).

Articles and Other Online Sources

1.　Business Insider, Business Intelligence Report on Social Engagement (http://www.businessinsider.com/social-media-engagement-statistics-2013-12).

2.　Business Insider Depiction of Social Graph (http://static3.businessinsider.com/image/4f5112e169bedd1526000061/facebook-open-graph.jpg).

3.　MarketingLand (http://marketingland.com/facebooks-latest-tweaks-favor-friends-could-hurt-page-reach-125931).

4.　W. Oremus, "That Facebook Copyright Notice Is Still a Hoax" November 26, 2012, Slate (http://www.slate.com/blogs/future_tense/2012/11/26/facebook_copyright_notice_berner_convention_status_update_still_a_hoax.html)

5.　Trade publication, Advertising Age, Nov. 22, 2011, (adage.com/print/231128).

6.　Peter Elbaor, "The Interconnection of Facebook Fan Pages" October 28, 2011, ComScore Insights Blog, (http://www.comscore.com/Insights/Blog/The-Interconnection-of-Facebook-Fan-Pages).

7.　Webtrends, white paper, 2011. Reported in The Wall Street Journal, "How Much Does a Facebook Fan cost?" February 1, 2011. Based on data in WebTrends®, "Ads for Fans", 2012, p. 4.

8.　Facebook CEO Mark Zuckerberg's public post on Facebook.com of August 27, 2015, at: (https://www.facebook.com/zuck/posts/10102329188394581)

9.　Wolfram|Alpha Knowledgebase, using data from the World Bank (http://www.wolframalpha.com/ accessed 10/26/15).

10.　US Census projections and Statistics Canada estimates [In: http://www.census.gov/population/projections/data/national/2014/summarytables.html, and http://www.statcan.gc.ca/pub/91-002-x/2015002/t002-eng.pdf]

11.　"IAB Social Media Buyers Guide" by Facebook's Adam Isserlis, Manager, Corporate Communications, Ads/Monetization; Colleen Coulter, Product Marketing Communications Manager available on the Interactive Advertising Bureau website (http://www.iab.net/socialmediabuyersguide).

12.　Facebook for Developers website: https://developers.facebook.com/.

13.　"Instant Articles" initiative and new deals with publishers like the Washington Post (http://media.fb.com/2015/05/12/instantarticles/).

14. Expanding the power of Facebook search (http://newsroom.fb.com/news/2015/10 /search-fyi-find-what-the-world-is-saying-with-facebook-search/).

15. Video, with video hosting and action tracking (http://newsroom.fb.com/news/2015 /06/news-feed-fyi-taking-into-account-more-actions-on-videos/), app acquisitions like Instagram and WhatsApp, and with plugins to track activities outside of Facebook

16. Google Products and Advertising Platforms (www.thinkwithgoogle.com/products/)

17. "Digital Advertising Report Q3 2015," Adobe Digital Index (www.cmo.com/adobe-digital-index.html), p.18, 24.

18. Open Graph protocol, this is used on Facebook to allow any web page to have the same functionality as any other object on Facebook. See: http://ogp.me/.

19. https://developers.facebook.com/docs/graph-api

20. Facebook SDK Documentation (https://developers.facebook.com/docs/javascript/quickstart/v2.5#plugins).

21. J. Kincaid in: TechCrunch (http://techcrunch.com/2009/02/09/facebook-activates-like-button-friendfeed-tires-of-sincere-flattery/).

22. Facebook Help Center (Each Facebook account has a unique username. On a user's timeline page, their username will appear at the top of the browser and look something like www.facebook.com/[username]). https://www.facebook.com/help/228578620490361.

23. Facebook, Social Plugins FAQs, at: https://developers.facebook.com/docs/plugins/faqs/#ref.

24. Facebook for Business post on November 14, 2014 (https://www.facebook.com/business/news/update-to-facebook-news-feed).

25. Facebook Media, "An Update to News Feed: What it Means for Businesses" (https://www.facebook.com/business/news/update-to-facebook-news-feed)

26. "News Feed FYI: Balancing Content from Friends and Pages" (http://media.fb.com/2015/04/21/news-feed-fyi-balancing-content-from-friends-and-pages/).

27. Facebook's disclosure in connection with the redesign of the Messenger platform, at: https://www.facebook.com/notes/facebook-engineering/the-underlying-technology-of-messages/454991608919

28. Facebook, between August 2012 and May 2013 user engagement, as illustrated in the number of likes generated per day, increased from 2.7 Billion to 4.5 billion on average

(https://www.facebook.com/photo.php?fbid=10151908376831729&set=a.
10151908376636729.1073741825.20531316728&type=1&theater).

29.   Nielsen "Quickly and Accurately Measure the Effectiveness of Your
       Online Ad Campaigns" available as:
       www.nielsen.com/content/dam/nielsen/en_us/documents/pdf/Fact%20She
       ets/Nielsen%20BrandLift.pdf.

30.   National Public Radio, Planet Money "For $75, This Guy Will Sell You
       1,000 Facebook 'Likes'" originally broadcast on May 16, 2012
       (http://www.npr.org/sections/money/2012/05/16/152736671/this-guy-will-
       sell-you-sell-you-1-000-facebook-likes).

31.   https://www.facebook.com/notes/facebook-engineering/tao-the-power-of-
       the-graph/10151525983993920

32.   "Uniform Resource Locators (URL): A Syntax for the Expression of
       Access Information of Objects on the Network" by Tim Berners-Lee
       (March 1994) in: http://www.w3.org/Addressing/URL/url-spec.txt.

33.   US Census Bureau, Geographical Mobility: 2005 to 2010 (December
       2012), Table 2, Page 5 (http://www.census.gov/prod/2012pubs/p20-
       567.pdf).

34.   https://www.facebook.com/help/cookies/

Document produced by Defendant in Campbell et al. v. Facebook, Inc.

1.   FB000012475
2.   FB000015766
3.   FB000026790
4.   FB000026793
5.   FB000011745
6.   FB000011715
7.   FB000008271

Other Information

1.   Plaintiffs' Consolidated Amended Complaint filed on April 25, 2014

2.   Facebook, Inc. 2014 10-K

3.   Facebook, Inc.'s 2015 Q3 Earnings Report (November 4, 2015) At:
      http://investor.fb.com/results.cfm

4.   Facebook, Inc.'s 2015 Q2 Earnings Report, July 29, 2015

5.   Facebook, Inc. 2012 10-K

6.   Second Quarter, 2015 Earnings Call held on July 29, 2015. Available at:
      http://investor.fb.com/results.cfm.

7.   Facebook securities registration statement (SEC Form S-1/A May 16,
      2012 p 2).

8.   Facebook F8 Developer Conference, April 21, 2010.

9.   Facebook, Inc. 2010 10-K Disclosures