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Attorneys for Putative John Doe in 2:12-  
cv-08333-ODW-JC

**UNITED STATES DISTRICT COURT  
FOR THE CENTRAL DISTRICT OF CALIFORNIA**

INGENUITY 13 LLC,

Plaintiff,

v.

JOHN DOE,

Defendant.

Case No. 2:12-cv-08333-ODW-JC

**DECLARATION OF SETH SCHOEN**

Case Consolidated with Case Nos.:  
2:12-cv-6636; 2:12-cv-6669; 2:12-cv-  
6662; and 2:12-cv-6668

Case Assigned to:  
District Judge Otis D Wright, II

Discovery Referred to:  
Magistrate Judge Jacqueline Chooljian

Complaint Filed: September 27, 2012  
Trial Date: None set

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## DECLARATION OF SETH SCHOEN

I, Seth Schoen, declare and state as follows:

1. I am a Senior Staff Technologist with the Electronic Frontier Foundation (EFF). I am over eighteen years of age. I make this declaration on my own personal knowledge and if called upon to testify thereto, I could and would competently do so.

2. I have worked with computers and computer networks for over a decade. I have published two peer-reviewed academic papers in the field of computer security, and been interviewed about computer networking and computer security in the national news media. I have testified about electronic communications systems in three courts and before the United States Sentencing Commission, and have submitted expert testimony concerning the analysis of BitTorrent file-sharing networks to the federal courts in at least fifteen other matters.

3. I was requested by Morgan Pietz, counsel for a putative John Doe in the above-captioned action, to research and provide an objective response to several statements made in the Declaration of Joshua Chin in Support of Response to Order to Show Cause, which was filed on April 8, 2013, and to factual assertions in the oppositions to the Order to Show Cause. Specifically, I was asked to research and respond to these issues:

a. Whether the protocol described by Peter Hansmeier in his declaration in the above-captioned case is a reasonably accurate means of identifying the Internet Protocol (IP) addresses of computers involved in file-sharing using the BitTorrent protocol.

b. Whether an incomplete download of a video file using BitTorrent results in the downloader having a viewable copy of the file.

c. What the metadata associated with the documents filed by the plaintiffs in this action reveal about who was involved in their drafting.

1           4.     In forming these opinions, I relied upon the Declarations of Peter  
2 Hansmeier filed in the above-captioned case (ECF No. 8-1) and in case 2:12-06662-  
3 ODW (ECF No. 6-1); Brett L. Gibbs' Response to the Order to Show Cause in the  
4 above-captioned case (ECF No. 49); the Declaration of Joshua Chin in Support of  
5 Response to Order to Show Cause (ECF No. 108-1); the pleadings, declarations, and  
6 exhibits filed in connection with the Court's February 7, 2013 Order to Show Cause;  
7 certain other pleadings filed in the above-captioned case and in the related cases, all  
8 of which were electronically filed on the CM/ECF system by Brett Gibbs' CM/ECF  
9 account and are identified below; and the authorities I cite below.

10           **The Accuracy of Plaintiff's Means of Identifying IP Addresses**

11           5.     While the Hansmeier Declaration purports to describe the method by  
12 which the Plaintiffs in these consolidated cases identify the IP addresses of copyright  
13 infringers, the declarations omit information that I believe is material to a  
14 determination of whether that method is reasonably accurate.

15           6.     For example, Mr. Hansmeier states that his software records the  
16 "percent of the file downloaded by [his firm]'s software from the infringer's  
17 computer" (Hansmeier Decl. at 20), but also that his firm's software "does not [...]  
18 allow me to [...] communicate with [the infringer's] computer in any way"  
19 (Hansmeier Decl. at 21). It is thus unclear whether or to what extent the software  
20 downloaded portions of the file from individual defendants, and Mr. Hansmeier did  
21 not file this information with the Court, although he states that he has it on file  
22 (Hansmeier Decl. at 26). Similarly, it is unclear to what extent Mr. Hansmeier's  
23 software relied on information obtained from third-party BitTorrent trackers (which  
24 facilitate downloads) as opposed to information obtained by direct observation of  
25 and communication with defendants' computers.

26           7.     These omitted details could be important because simple methods of  
27 attempting to locate copyright infringers can easily go awry. For example, in 2008,  
28 researchers from the University of Washington found that, given then-prevalent

1 methods for investigating BitTorrent transfers, it was straightforward to frame  
2 particular IP addresses for downloading files that they had not, in fact, ever  
3 attempted to download. The researchers experimentally framed their own laser  
4 printer and succeeded in eliciting false allegations of copyright infringement against  
5 it. See Michael Piatek, Tadayoshi Kohno, and Arvind Krishnamurthy, “Challenges  
6 and Directions for Monitoring P2P File Sharing Networks, or, Why My Printer  
7 Received a DMCA Takedown Notice,” in *Proceedings of the 3rd USENIX Workshop*  
8 *on Hot Topics in Security*, July 29, 2008, available at  
9 [http://www.usenix.org/event/hotsec08/tech/full\\_papers/piatek/piatek.pdf](http://www.usenix.org/event/hotsec08/tech/full_papers/piatek/piatek.pdf).

10 8. I do not mean to suggest that Mr. Hansmeier is unable to gather or did  
11 not gather relevant information to support Plaintiff’s allegations, including by  
12 techniques that avoid the pitfalls described by Piatek *et al.* However, paragraphs 20,  
13 25, and 26 of his declaration indicate that he filed with the Court only a small  
14 summary portion of the information that he gathered. In paragraph 27, Mr.  
15 Hansmeier says he “personally observed” infringing transmissions; his statement that  
16 his firm’s software does not “communicate” with Defendants’ computers leaves  
17 some ambiguity about the exact nature of this observation.

18 9. Without more information about how Plaintiff gathers IP addresses and  
19 attribute infringing activity to them, it is my opinion that an investigation like  
20 Plaintiff’s could result in the identification of IP addresses of computers that were  
21 not actually participating in infringing filesharing activity, or that had not been  
22 directly confirmed to have done so.

### 23 **The Usability of Partial Downloads**

24 10. BitTorrent divides each file into “pieces,” which are subregions of the  
25 file that are downloaded independently of one another. When a BitTorrent user  
26 begins downloading a file, the BitTorrent client software receives pieces of the file  
27 from many other BitTorrent clients on the Internet. These pieces do not arrive in  
28 order, as they would when using the Hypertext Transfer Protocol (HTTP) or File

1 Transfer Protocol (FTP). Thus, at any given point during a BitTorrent download, the  
2 user will have some portion of the data in the complete file, but that portion will  
3 almost certainly consist of pieces separated by numerous gaps. For example, when  
4 downloading a ten-minute video file, a BitTorrent client may receive a few seconds  
5 of minute six, followed by a portion of minute two, and so on. At some point, if the  
6 download progresses, the user will have a complete or substantially complete copy of  
7 the file. It is statistically unlikely that the user would have large contiguous portions  
8 of the video early in the download.

9 11. An incomplete, interrupted BitTorrent download is often not useful to  
10 the downloader. For example, a partial video file containing gaps may be difficult to  
11 play through even if the majority of the file is present, both because the gaps may be  
12 disorienting to a human viewer and because they may cause computer software to  
13 regard the file as damaged or corrupt and stop the playback process.

14 12. I agree with Mr. Chin that the VLC Player is powerful and that under  
15 some circumstances it may be used to play portions of incomplete or damaged files.  
16 However, gaps in a video file (such as those caused by an incomplete BitTorrent  
17 download) could still interrupt the playback.

18 13. More significantly, VLC cannot easily play certain video file formats if  
19 the beginning of the file is missing.

20 14. I confirmed this by overwriting a small fraction of the beginning of a  
21 large video file with zero (null) bytes, which is the same condition as an incomplete  
22 BitTorrent download that is missing the beginning of the file. VLC was not willing  
23 to play this file when I pressed the "Play" button. Although an expert could use  
24 VLC, possibly in combination with other software, to locate and play intact video  
25 data from later regions of the file, most users would probably consider this file  
26 useless and unplayable.

27 15. Because BitTorrent client software applications normally download  
28 pieces of the file in a completely random order, it is quite possible, even common,



1 for the beginning of a file to be missing even when a significant fraction of the file's  
 2 content has already been downloaded. This is an important contrast with other kinds  
 3 of downloads where a file is downloaded sequentially from beginning to end, such as  
 4 an HTTP or FTP file download. Unlike these downloads, BitTorrent downloads do  
 5 not happen in sequential order.

6 16. Under the assumption that pieces are downloaded in a random order,  
 7 there is a certain probability of having received at least a specified amount of data  
 8 intact and contiguous at the beginning of the file. The probability of having at least  
 9 the first  $b$  pieces of the file after downloading  $k$  out of  $n$  total pieces can be  
 10 calculated explicitly as

$$p = \frac{\binom{n-b}{k-b}}{\binom{n}{k}}$$

11 where

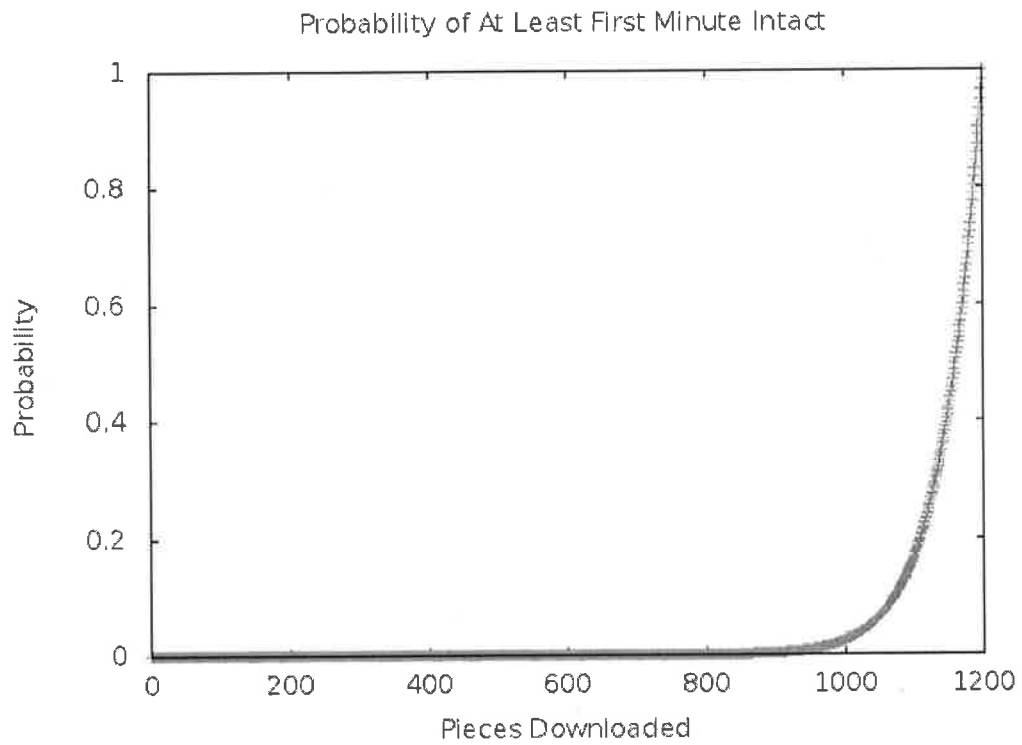
$$\binom{x}{y} = \frac{x!}{y!(x-y)!}$$

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 19 is the “choose” function from probability, indicating the number of distinct ways of  
 20 choosing  $y$  objects from a set of  $x$  objects. The general pattern is that this probability  
 21 remains extremely low while a download is incomplete (even when a substantial  
 22 majority of the file has been downloaded), and then grows quickly as the download  
 23 nears completion.

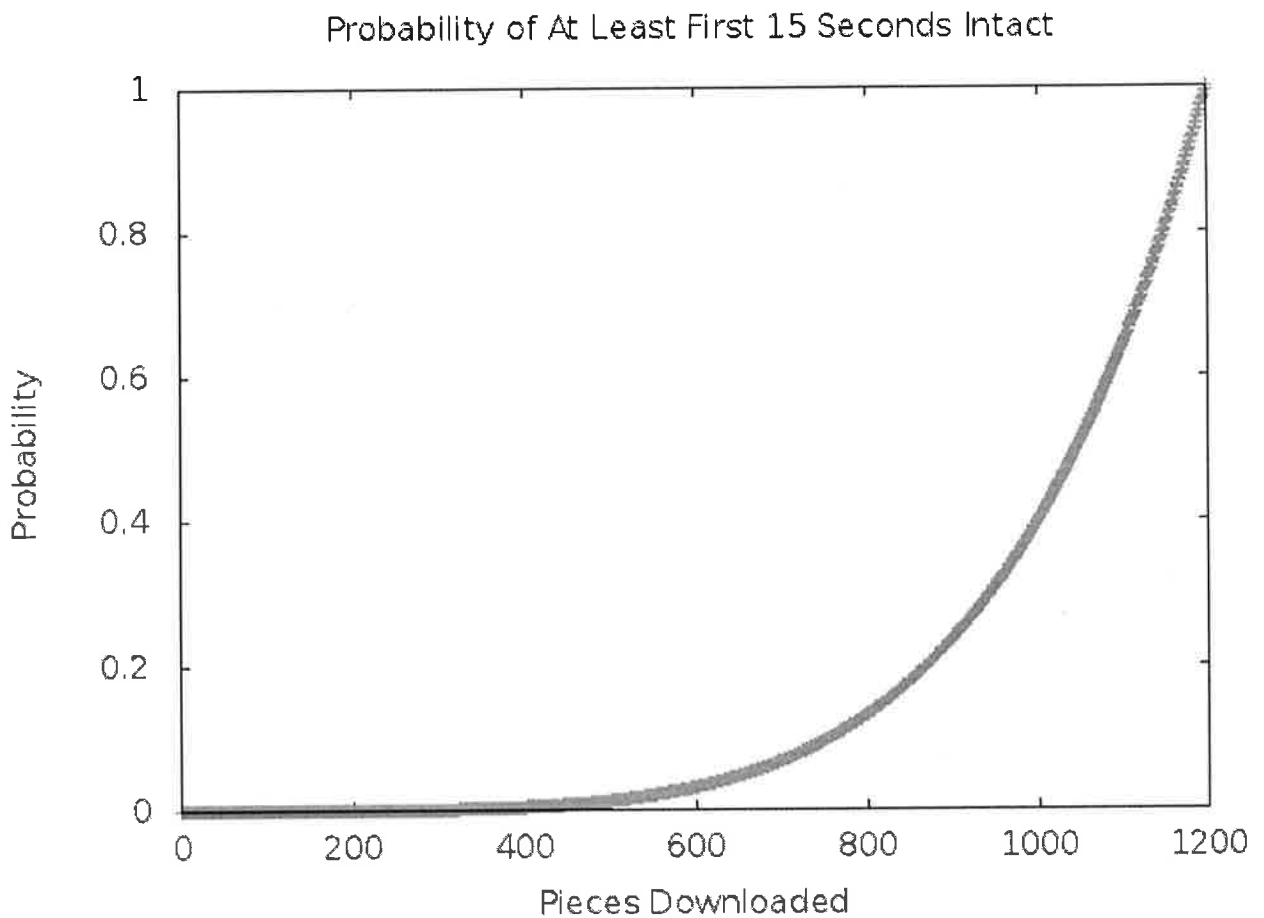
24 17. For example, consider a 60-minute video file of 300 megabytes in size  
 25 which is being distributed via a BitTorrent swarm. Suppose that the file has been  
 26 divided into 1200 pieces of 256 kilobytes each. This graph shows the explicit  
 27 probability that a given downloader has obtained the first one minute (5 megabytes,  
 28 or twenty pieces) of contiguous video content, and hence can play through the first

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minute of video without interruption, once the downloader has downloaded a specified number of pieces:



1 18. Here is the corresponding graph for the ability to play the first 15  
2 seconds of this file (1.25 megabytes, or five pieces):  
3



19 19. I have heard that some BitTorrent clients could be set to prioritize  
20 downloading the beginning of the file before other parts, but this is not, to my  
21 knowledge, standard or default behavior in BitTorrent software because it would  
22 have a deleterious effect on the speed and efficiency of a BitTorrent swarm as a  
23 whole.

24 20. According to the Hansmeier Declaration, Plaintiffs use “proprietary  
25 forensic software to conduct an exhaustive real time ‘fingerprint’ of [a BitTorrent]  
26 swarm.” Hansmeier Decl. ¶ 20. This statement, as well as Mr. Hansmeier's  
27 observation that “while [his firm] detects an infringement at a particular instant, the  
28 infringer may, and likely is infringing at other times as well” (id. ¶ 21), suggests that



1 Plaintiffs observe a swarm and a defendant’s participation in that swarm at a single  
2 moment in time. At any given moment, participants in the swarm will have  
3 downloaded different amounts of data.

4 21. Although Mr. Hansmeier states that “[o]nce obtaining a full version of  
5 the Video file, John Doe . . . shared pieces of that copyrighted Video file . . . with  
6 other individuals” (id. ¶ 27), it is unclear from his declaration whether Mr.  
7 Hansmeier observed that any given Doe did in fact obtain a full version of the video  
8 file, or whether Mr. Hansmeier was merely speculating that the Doe would  
9 eventually obtain a full version. His testimony at ¶ 21 that “6881 detects an  
10 infringement at a particular instant” suggests that his statement at ¶ 27 about a  
11 particular Doe “obtain[ing] a full version” is speculative.

12 22. Many BitTorrent downloads fail to complete or are interrupted. Thus,  
13 many of the computers observed to have a partial download at a given time will not  
14 complete the download and will not obtain a usable video file. Without more  
15 information about how the Plaintiffs determine the nature and extent of a Doe  
16 defendant's downloading activity, it is my opinion that the investigation described in  
17 the Hansmeier Declaration could result in the identification of IP addresses of  
18 computers that did not download a usable video file.

19 23. In his declaration, Mr. Chin stated that “Use of the VLC Player has  
20 produced up to five seconds or more of images from a video file that had been the  
21 subject of no more than thirty seconds of downloading.” However, Mr. Chin did not  
22 specify how the VLC Player was used in that instance, nor what protocol was used to  
23 download the file. A file downloaded using HTTP, FTP, or another protocol that  
24 downloads a file in linear fashion would, when interrupted, be more likely to result  
25 in a file directly usable by an unskilled user. If Mr. Chin was referring to an  
26 interrupted BitTorrent download, it is likely that the playback he described required  
27 more than simply pressing “Play” in the VLC Player.

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28. My analysis revealed that the following files were “created” by user “Paul”:
- Ps Sanctions Motion.pdf (ECF No. 22, created Dec. 17, 2012)
  - P's Response to Anonymous Doe Movant's Ex Parte Appl for Leave to Take Early Discovery and Stay.pdf (ECF No. 27, created Dec. 20, 2012)
  - Motion to Disqualify Judge Wright.pdf (ECF No. 35, created Dec. 30, 2012)
  - Opp to Request for Leave to File Response to Motion to Disqualify.pdf (ECF No. 39, created Jan. 7, 2013)
  - Notice of Voluntary Dismissal.pdf (ECF No. 43, created Jan. 28, 2013).

And in *AF Holdings, LLC v. John Doe*, No. 12-cv-6636:

- P's Response re Failure to Serve.pdf (ECF No. 15, created Dec. 27, 2012)

And in *AF Holdings, LLC v. Chaz Forsyth*, No. 12-cv-6669:

- P's Response re Failure to Serve.pdf (ECF No. 18, created Dec. 27, 2012)

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on April 16, 2013 at San Francisco, California.



Seth Schoen