

**STATEMENT OF INTEREST AND COMMENTS OF THE  
U.S. TECHNOLOGY POLICY COMMITTEE  
OF THE ASSOCIATION FOR COMPUTING MACHINERY IN  
U.S. COPYRIGHT OFFICE DOCKET NO. 2021-10 RE:  
TECHNICAL MEASURES UNDER 17 USC §512**

The non-profit and non-lobbying Association for Computing Machinery (ACM), with more than 50,000 U.S. members and approximately 100,000 worldwide, is the world's largest educational and scientific computing society. ACM's U.S. Technology Policy Committee (USTPC), currently comprising more than 160 members, serves as the focal point for ACM's interaction with all branches of the US government, the computing community, and the public on policy matters related to information technology. As such, the Committee strives to serve as an apolitical source of expert information.<sup>1</sup>

USTPC hereby states its interest in participating in plenary and sectoral discussions convened in this proceeding and will be represented in them by Dr. Lee Hollaar (Professor Emeritus, University of Utah School of Computing) and Professor Pamela Samuelson (Distinguished Professor, Berkeley Law and Co-Director, Berkeley Center for Law & Technology). Prof. Hollaar's direct email is [hollaar@CS.UTAH.EDU](mailto:hollaar@CS.UTAH.EDU). Prof. Samuelson is reachable at [psamuelson@berkeley.edu](mailto:psamuelson@berkeley.edu).

USTPC also is pleased to offer the following responses<sup>2</sup> to Questions 6 and 7 of the Copyright Office's Notification of Inquiry<sup>3</sup> in the above-referenced proceeding:

***6. To what extent would the adoption and broad implementation of existing or future technical measures by stakeholders, including online service providers and rightsholders, be likely to assist in addressing the problem of online copyright piracy?***

The adoption and broad implementation of existing or future technical measures by stakeholders may reduce but will not eliminate online copyright piracy. Determined and skilled commercial infringers will continue to create black markets and methods of circumventing technological protection measures. Widespread adoption of such technical measures, however, could further marginalize such actors, and consequently reduce the negative impact of large-scale, profit-driven piracy on copyright holders. Such measures also may enable a more frictionless, non-infringing marketplace for online service providers and consumers.

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<sup>1</sup> To arrange for a technical briefing from USTPC and other ACM expert members, please contact Adam Eisgrau, ACM Director of Global Policy & Public Affairs, at [acmpo@acm.org](mailto:acmpo@acm.org) or 202-580-6555.

<sup>2</sup> The following individuals were principal contributors to these Comments for USTPC (affiliations for personal identification purposes only): Vinton Cerf (Past President of ACM and Vice President & Chief Internet Evangelist, Google); Dr. Lee Hollaar (Professor Emeritus, University of Utah School of Computing); Paul Hyland (Chair, USTPC Intellectual Property Subcommittee and Principal, Solutions Consulting); and Pamela Samuelson (Distinguished Professor, Berkeley Law and Co-Director, Berkeley Center for Law & Technology).

<sup>3</sup> 86 Fed. Reg. 72638 (December 22, 2021)

***What are the obstacles to adopting and broadly implementing such existing or future technical measures?***

A voluntary universal or standard technical protection regime would require the creation of a central repository of copyrighted works and their associated catalog/metadata information, as well as some sort of cryptographic hash or code to uniquely identify each work. Any such centralized repository, however, would need to meet stringent technical requirements, including:

- Scalability – to keep pace with growing volumes of both copyrighted works and of Online Service Providers (OSPs) checks of new content for infringement.
- Security – to prevent either tampering with records of registered works or the unfettered submission of new registrations as a form of “denial-of-service” attack.
- Robustness – to preclude outages, or at least make them exceedingly rare.<sup>4</sup>

Once such a repository has been created, actually using it to identify infringing content fairly and accurately will present even more difficult challenges that may prove to be insurmountable.

Specifically, while determining an exact match with a copyrighted work may be relatively straightforward to automate, if there are any differences – ranging from trivial to complex – it may become difficult to impossible to detect whether the content in question is a partial or essentially complete duplicate of a copyrighted work. Relying on machine learning to solve this problem may not be feasible, and even if it were so, the actual reasons for determining an infringing match are likely to be difficult to understand, if not entirely unknowable.

Additionally, using today’s technology,<sup>5</sup> it is unlikely to be possible for algorithmic processing alone to adequately replicate the subjective human judgment necessary to determine whether a possibly infringing use of a work meets the definition of fair use under the four-factor test articulated in Section 107 of the Copyright Act.<sup>6</sup> Any such deficiency could render the use of an automated system in this context not only inaccurate and inefficient, but potentially unconstitutional.

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<sup>4</sup> In the case of an outage, new copyright clearances would need to default to either yes or no, most likely to yes so that legitimate uses of copyrighted works aren’t completely shut down.

<sup>5</sup> See *U.S. Copyright Office Fair Use Index*, U.S. Copyright Office (December, 2021), <https://www.copyright.gov/fair-use/index.html>.

<sup>6</sup> The statute requires a determination of fair use to be made upon consideration of: 1) the purpose and character of the use, including whether the use is of a commercial nature or is for nonprofit educational purposes; 2) the nature of the copyrighted work; 3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and 4) the effect of the use upon the potential market for or value of the copyrighted work.

Human adjudication could be employed in cases that return partial matches or implicate fair use. Doing so, however, would likely produce insurmountable scalability challenges, especially when under pressure to provide timely responses.

Nor will a simple comparison of cryptographic hashes of registered works with those of content available via an OSP be sufficient, except in cases where the copy is wholly identical to the original. Any system that employs AI or machine learning to detect a partial match is likely to introduce errors in either direction, both flagging non-infringing materials (false positives) and missing infringing ones (false negatives).

Minimizing false negatives (failures to detect infringing content) might satisfy the interests of content owners. However, false positives (content mistakenly flagged as infringing) run the risk of inaccurately and unjustly penalizing users or OSPs. Google's Content ID system is used to prevent infringement but instances of false positives and overblocking have been reported.<sup>7</sup>

Lastly in this regard, Section 512 stipulates that technical measures may "not impose substantial costs on service providers or substantial burdens on their systems or networks."<sup>8</sup> While such systems may be affordable for large OSPs, such as Google or Facebook, smaller entities or innovative new providers might find implementing required technical measures either to be cost-prohibitive or to force them to sacrifice features or functionality that would differentiate them in the marketplace. Such technical measures will need to be priced on a sliding scale and not be too technically burdensome to implement and operate so that virtually every OSP will be able to employ them.

***Would the adoption and broad implementation of such existing or future technical measures have negative effects? If so, what would be the effects, and who would be affected?***

For the reasons detailed above, technical measures have the potential to restrict legitimate uses of copyrighted content in every sector of society if insufficiently accurate and/or overly restrictive, including creators of new or transformative content, businesses of all sizes, educators, and the public at large. Conversely, if these measures are ineffective in blocking unlawful content use, actual piracy may not be sufficiently mitigated.

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<sup>7</sup> See: The YouTube Team, *Access for all, a balanced ecosystem, and powerful tools*, YouTube Official Blog (December 6, 2021), <https://blog.youtube/news-and-events/access-all-balanced-ecosystem-and-powerful-tools/>, Paul Keller, *YouTube Copyright Transparency Report: Overblocking is real*, Kluwer Copyright Blog (December 9, 2021), <http://copyrightblog.kluweriplaw.com/2021/12/09/youtube-copyright-transparency-report-overblocking-is-real/>, and Ax Sharma, *Google Drive flags nearly empty files for 'copyright infringement'*, Bleeping Computer (January 25, 2022), <https://www.bleepingcomputer.com/news/security/google-drive-flags-nearly-empty-files-for-copyright-infringement/>

<sup>8</sup> 17 U.S.C. 512(i).

***7. Is there a role for government to play in identifying, developing, cataloging, or communicating about existing or future technical measures for identifying or protecting copyrighted works online?***

Government could help facilitate the identification and cataloging of such technical measures by creating a clearinghouse for information about them, including all necessary details required to enable adoption by new entrants, and by publicizing their existence to stakeholders and the public. USTPC believes, however, that government should not itself seek to develop such standards.<sup>9</sup> Rather, the development and maintenance of such standards would be better left to organizations well versed in creating such technical standards, such as the American National Standards Institute (ANSI) or the Institute of Electrical and Electronics Engineers (IEEE). This is not to say that government cannot play a constructive role in the standard development process by, for example: convening relevant experts (its own included),<sup>10</sup> setting parameters for standards based upon operative statutory language, and assuring that all stakeholder groups are represented – including particularly non-corporate content creators and end users (the public).

***Can the government facilitate the adoption or implementation of technical measures, and if so, how?***

Particularly in the case of any technical measure that is to be widely adopted, government can act as the central repository of copyright information, via an expanded copyright registration system or something analogous to it. Such a repository might also: 1) include digital signatures to use in identifying works as part of an STM; 2) catalogue universal technical measures that have been widely adopted; and 3) be sustained financially (and permitted to scale up as needed) with the support of periodic renewal fees from copyright owners like those presently employed for the maintenance of patents.

***Are there technical measures or other standards used to protect copyrighted works online of which the government should be aware when implementing statutory or regulatory provisions, such as requirements for procurement, grants, or required data inventories?***

USTPC is not aware of any such technical measures or standards, in development or currently in use, that would constrain or inform new technical measures contemplated in this inquiry.

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<sup>9</sup> We note, with respect, that the Copyright Office has little experience in this area.

<sup>10</sup> The Library of Congress, for example, has in the past applied its expertise in metadata and information retrieval to the development of standards in those spheres.