

Digital Copyright Management Mechanism Based on Dynamic Encryption for Multiplatform Browsers

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ABSTRACT

In recent years, the internet and smart devices have developed rapidly. Many people no longer rely on newspapers, magazines, or television to receive news. They can see the latest news using computers or mobile phones. According to a study by the Taiwan Internet Information Center, nearly 90% of Taiwanese people have used the internet. Many online streaming services have emerged, and people can easily watch movies and TV programs through computers or mobile phones. Hence, some websites use digital copyright management mechanisms to protect videos from being directly downloaded. However, 30% of websites use AES-128 encryption to protect their content. If the key access mechanism is not well protected, the encryption methodology may be useless. Therefore, this paper proposes a cross-platform digital copyright management mechanism for adaptive streaming. With this mechanism, users do not need to download additional applications, as the mechanism implements Web-Assembly language through the browser.

KEYWORDS

Adaptive Streaming, Digital Right Management, Dynamic Encryption, RSA Encryption, Web-Assembly Language

INTRODUCTION

With the advancement of technology and the popularization of the internet, many people have begun chatting or watching news or other videos online. Figure 1 depicts the 2019 Taiwan Internet Report released by the Taiwan Internet Information Center (Taiwan Network Information Center, 2019). According to this report, 89.6% of the domestic population older than 12 has used the internet, and 85.6% have used audio-visual and live broadcasts. This report also demonstrates that most people watch videos through the internet. Modern people no longer obtain news and entertainment through

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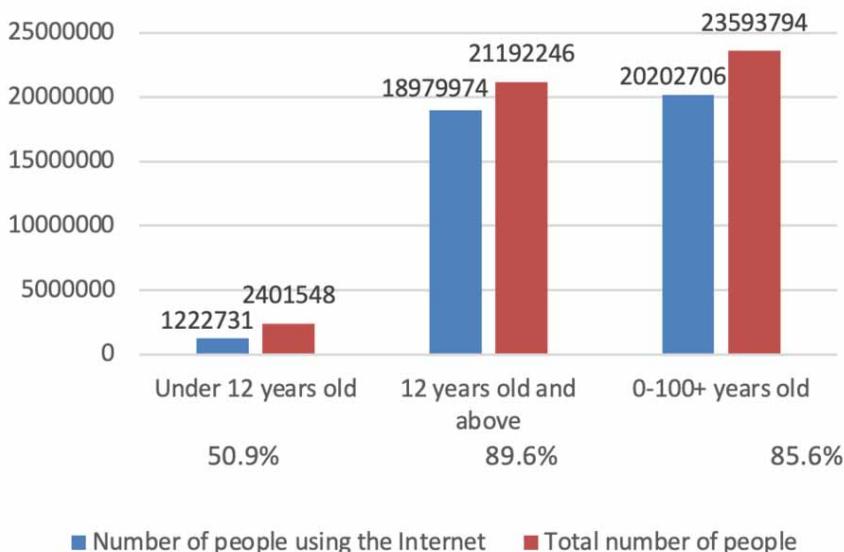
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only television programs or newspapers and magazines, and they do not need to stay in front of the TV or go to the cinema to watch movies and TV series. Modern people are adopting different electronic products, such as computers, tablets, mobile phones or TV boxes, to obtain information, watch videos or listen to music.

Various audio and video streaming formats such as Moving Picture Experts Group-Dynamic Adaptive Streaming over HTTP (MPEG_DASH) and HTTP Live Streaming (HLS), as well as digital rights management systems such as Widevine and FairPlay, have been developed to facilitate the smooth transmission of audio and video content over the internet. Many movie production companies and TV stations have started to provide users with online platforms to stream movies or music and have developed video streaming platforms, such as HBO Max and Disney+, which use digital rights management to mitigate the spread of piracy and directly downloading movies. However, most user’s device has the limitation on the device such as the mobile phone or tablet. Some of them are equipped with limited memory space and lower computation power in their above devices. On the other hand, the streaming media format does not have the standard such as the HLS format for Apple’s device, another is MPEG-DASH, RTMP, and the last one is the SMOOTH format. In order to provide services to users across various devices, these streaming services must convert videos into various formats, which is a large burden on storage space. Furthermore, different DRMs support only specific browsers or operating systems. To protect video and audio content, 44.8% of platforms use paid third-party DRM solutions. As shown in Figure 2, 40% of video and audio platforms still do not use any digital rights management systems. 29% of platforms use HLS+AES-128; however, this system may not have any effect if the key acquisition method is not controlled.

Therefore, this paper uses (Wu, 2020) as a foundation to propose building a streaming digital rights management mechanism that supports multiplatform browsers and stores only one file format with the dynamic encryption of video clips. Not only this approach can let users prevent installing extra software or browser’s plugins to fetch the desired video clip efficiently but also it also reduces the redundant encrypted media file format to decrypt by the video server.

Figure 1. Estimated number of internet users in Taiwan in 2019
 Source: 2019 Taiwan internet Report



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