



Copyright Protection through Deep Packet Inspection- An Indian Perspective

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Abstract — The beginning of 21st century saw file sharing of copy righted materials emerging as a major threat to the established business models of the content industry. The intellectual property rights in the real world scenario holds true in the virtual world also. This paper tries to understand the various issues of copy right violation in India. It also introduces deep packet inspection, a method to analyze the traffic in real time as an effective solution.

Index Terms— Copyright, intellectual property, piracy, deep packet inspection, pattern matching.

I. INTRODUCTION

Copyright is what protects original works of many kinds from being wrongly copied and distributed. Violating a copyright means illegally downloading and sharing copyrighted music, movies, etc. There are edicts to protect people that have their material copyrighted. Copyright is the right given by law to the originators of literary, dramatic, musical and a variety of other works of mind. In general, it means the creator alone has the right to make copies of his or her works or on the other hand, prevents all others from making such copies.

The Recording Industry Association of America is trying to crack down on those who illegally download and share music through the use of their computers. This past year, they have filed many proceedings, and will continue to protect the copyright holders, such as artists and record labels. Crookston, University of Minnesota, is also trying to stop students from performing the illegitimate act of downloading and sharing files on their PCs.

II. COPYRIGHT AND NATIONAL ECONOMY

The copyright based industries together generate huge employment in the country of its origin. National funds edges from the contribution created by these industries within the type of tax, sales tax, excise duty, etc. from the assembly and sale of proprietary product [1]. The total copyright industries taken together (i.e. core industries plus those distribute copyrighted products and other products those depend on wholly or principally on copyrighted materials) employed more than 5.7 million workers (about 4.8% of total U.S. workforce) and accounted for approximately 5.69% US GDP in 1993. In India, no estimates are available to ascertain contribution of copyright based industries to the national economy. The other core copyright industry namely films and videos, also occupies an important place in the country. Films are considered as one of the best means of entertainment for the common people. India yearly produces more than 600 films in major languages such as Hindi, Telugu, Tamil, Malayalam and Kannada. The demand for the cable & satellite TVs are also on the peak. It is expected that during 1996 cable connection in the country had reached about 20 million houses covering approximately 10% of the total households in the country [2].

III. COPYRIGHT IN INDIA

The copyright in India has travelled a long way since it was introduced during the British rule. Flashbacking into some of the Indian copyright violation cases that flare up and finally waned in the last decades:

1. IPL vs. The Web: On August 2009, The Indian Premier League's (IPL's) strict instructions for broadcast media couldn't forestall copyright infringements of an outsized range of "unauthorized" videos and live feeds throughout its second edition in South Africa. Over 2,400 unlicensed live streaming feeds and over half-dozen, 700 unauthorized videos on the online were force down, whereas over one, 300 pirated blogs or websites were finish off [4].
2. Percept Picture Company claimed against the making of Shoebite, a UTV production was a direct copy of Johny Walker [3].
3. Emami Ltd has served a legal notice to Arbaaz Khan Productions for using 'Zandu balm' in the latest Salman Khan block-buster 'Dabangg' citing copyright infringement. The Kolkata-based firm's move is against the usage of the firm's 'Zandu Balm' in the hugely popular item number 'Munni Badnaam' in the movie.
4. US-based novelist Barbara Taylor Bradford, the author of 'A Woman of Substance' had filed a copyright infringement in the High Court against Sahara Entertainment's 'Karishma-A miracle of Destiny' [3].
5. Vimeo/Pirate Bay vs. Copyright Labs, 2012: The very recent copyright infringement case that caused an upheaval in the Indian Parliament and led to the passing of the copyright amendment bill. Vimeo and other major torrent sites were blocked by various Internet Service providers such as Reliance and Airtel. [4].
6. Open Mind vs. Star India, 2011: The Delhi High Court issued a notice to TV channel Star India Pvt. Ltd, producers Babble Fish, and sponsors Bacardi based on a petition filed by the company Open Mind and music, and writer musician Manish Kumar claiming that Star India . Has infringed its copyright by telecasting the program 'The Dewarists' on Star World'. [4]
7. Guruji.com vs. T-Series, 2010: The CEO and other high officers of Guruji.com, were arrested in Bangalore on charges of copyright infringement by making musical content online free which was originally owned by T-Series [4]
8. Indian Company RJ Softwares vs. Hasbro, 2008 : Hasbro, an American game company sued RJ Softwares claiming Scrabulous, an online word game available on Facebook violated the Copyright Act and infringed upon Hasbro's IPR [4]

9. Satyameva Jayate, an Indian Talk Show was in news for a number of reasons, one of them is copyright infringement. The anthem had been picked up from Indian rock band Euphoria's song Satyameva Jayate. [3]
10. A wholesaler in Kolkata was arrested for importing colourful towels with the images of Donald Duck, Minnie Mouse, Pluto or Little Mermaid. These towels come in from China and are sold for about Rs 25 whereas a genuine Walt Disney licence holder like Bombay Dyeing would be retailing a similar towel for Rs 250 onwards," utters a Delhi-based investigator specialising in copyright infringement cases [3].
11. In Kolkata, watch dials are manufactured with great care. The moving mechanism of dial, which form the inner part of the watches are all imported (which again are fake from Korea, Japan and China), bring together here and sold as Tag Hauer or an Omega. [3]
12. Amritsar, Ludhiana and Rajkot are also great places for fake products, starting from tools to auto components [3].

IV. DEEP PACKET INSPECTION

Deep Packet Inspection intends to allow network operators to precisely identify the source and content of each data packet that passes through each layer of the OSI model of the network [7]. It handles the internet traffic in real time by scanning and analyzing the data packets through internet. The result of this analysis can be used for various purposes.

Implication of the deep packet inspection is in the intrusion detection (IDS) and prevention systems (IPS). An ID involves the detection of various form of malwares (VIRUS, worms and Trojans), etc digital signature of the copyrighted material present in the network. The IPS has all the capabilities of IDS along with the prevention capabilities. An IDS/IPS search engine scans the copyrighted material, looks for a digital signature embedded in the copyrighted material. If a match is found, the copyright violation is reported.

The basic task of DPI is 'recognition' [5]. The recognition task is to detect the matching digital signatures. Once if the match is found out, the immediate task is to trigger 'notification' for IDS and 'manipulation' for IPS. While 'notification' is just a passive intervention by which the violation is reported, 'manipulation' is active intervention where by the reproduction of the data packet is manipulated and controlled.

A network that uses DPI can analyze the network traffic with the help of three techniques:

- Using pattern matching schemes: These can scan packets for strings and bits anywhere in the packet even in the payload.[8]
- Behavior analysis: These scans the packets for recognizable, predefined patterns in communication including the packet sizes, data rate etc. [9]
- Statistical analysis: Based on mean, median and other statistical data.

The latter two can allow DPI to analyze traffic even in encrypted form [10].

V. DPI FOR COPYRIGHT PROTECTION

An important difference between the deep packet inspection for malware detection and copyright protection is that unlike for malware detection, for copyright protection the system cannot depend on a simple bit match or hash. It basically works on a fingerprinting model [5]. A vendor's software is used to generate the digital signature. The vendor can be a unified agency

providing electronic signature. It would be even better if the right owner himself can manage the copy right. The DPI engine should necessarily calculate the distinct features of the media in order to identify the source uniquely. The engine intercepts the content when it passes through the network, creates a fingerprint and then checks for the match.

VI. DEPLOYING DPI IN INDIA

Deployment of DPI is a really challenging task. As a country which respects the human rights to a great extent, such a move would necessarily face initial objections. More ever being a developing country, the ordinary people cannot afford buying original software and non-pirated IPs. Education should be given at the base level about the importance of copyright protection. Only after getting a majority support from public, the government should initiate such a move.

VII. CONCLUSIONS

India faces formidable challenges in handling the copyright issues. There should be a deliberate effort form the part of government to see that the intellectual rights are preserved. Here in this paper the role of deep packet inspection is discussed as a solution for the copy right problem.

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