



Locking or Unlocking Content?

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According to internal Teletrax (www.teletrax.tv) research, over 100 million hours of programs are broadcast on television alone each year worldwide, which is more than triple what was broadcast ten years ago. This vast increase in viewing consumption vividly illustrates the profound and disruptive changes the video industry is currently undergoing.

The introduction of new technologies has caused the broadcast industry to experience rapid and dramatic transformation. There are now a plethora of options to receive and view broadcast content. The amount of video content flowing through a growing number of delivery platforms, from the internet to mobile phones, is escalating at such a bewildering pace that it has radically transformed the way sport, news, advertising, program and film content is reaching its audience and being viewed. The linear television model is now rapidly being eroded in favour of the 'anywhere, anytime' model.

So how this is affecting the value of content? On one hand content is being delivered to a much wider pool of global viewers which increases its value. However, on the other hand, the variety of delivery platforms diminishes audience numbers. Add to this phenomenon

of the rapid increase in user generated content and the availability to watch almost any video minutes after it aired, and you witness a media landscape in unprecedented flux.

With content now becoming available to the masses in an extensive number of different formats just hours after being released on television, how can producers profit or even breakeven in such a short amount of time? How can content owners realise the full value of their video assets?

Many media executives are trying to find ways to limit the access of their content, and prevent a repeat of the issue the music industry has faced over the last decade. Piracy in particular has become a worldwide challenge. According to a 2005 Watch List report, piracy of motion pictures and other intellectual property in India alone cost the U.S. media producers more than \$500 million in 2004. Bob Wright, Chairman of NBC Universal, recently even claimed that piracy of motion pictures had cost the industry more than \$20 billion.

What is the solution? Should content be locked and viewing restricted, or simply freely distributed? There are a number of solutions available to content owners but many key industry

players agree that restricting access to content rarely works. After all, for every lock there is a key. It is usually only a matter of time before hackers find the way in.

In recent years, new systems have been developed that allow content to be tracked and the content owner alerted of its usage. However, a more sophisticated and scientific approach to protecting content and exercising better control over the management of assets is required. Consider a more robust and accurate solution - digital watermarking.

Digital Watermarking: The solution

Digital watermarking is a process in which specific data is included within media content, creating its own unique identity. The watermarking process is based on the imperceptible modifications to the video signal using special software. As the modifications have very low energy and continuously adapt to the content, the watermark is indiscernible and can only be detected and decoded using special hardware or software. Watermarks are imperceptible to the human eye, and it is virtually impossible to detect the presence of the watermark without proprietary decoding equipment. Any attempt to destroy or remove the watermark will ruin

the quality of the material in which it is embedded.

Digital watermarking enables the identification, management and tracking of digital images. It can be used for a variety of different applications, including broadcast verification, digital rights management, image copyright protection, identification security, forensic tracking and mobile commerce. Inserted watermarks can be used for several purposes, including identifying the content itself, identifying the party receiving the content, or triggering an action such as linking to other information.

The Digital Watermarking Process

The following terminology is commonly used when discussing watermarking technology:

- **Watermark** The identifier, which has been inserted into the multimedia content
- **Watermark Embedder** The process that adds the identifier to the audio visual content
- **Watermark Detector** The process that reads the identifier from the audio visual content

During the digital watermarking process, a watermark embedder

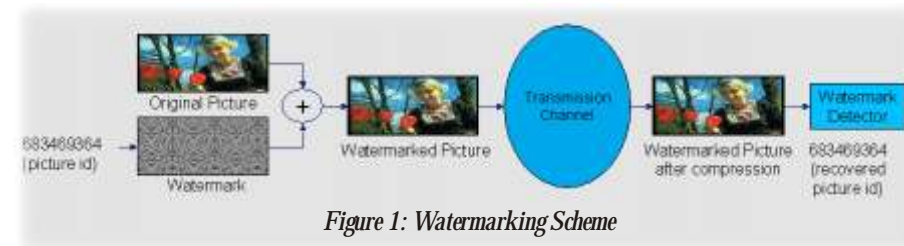


Figure 1: Watermarking Scheme

inserts a watermark by subtly modifying the multimedia content. The specific modifications depend on a 'secret key' and the information being embedded. Only a specialized

watermark detector using the same 'secret key' as the embedder can read this information again even if the content has been severely degraded in quality between the time of embedding and detection.

During watermark embedding, which is processed by using a 'secret key', the original signal remains unchanged. It also has a high degree of built-in redundancy, which means it can survive repeated recording on standard consumer VHS and DVD recorders.

No additional bandwidth is required and the vertical and horizontal blanking intervals are not used. The extra data is added by applying very small modifications to the pixel intensity in the active video. However, this is done in such a way that the changes are imperceptible to the eye so the end-user notices no change in picture quality.

Using sophisticated digital signal processing algorithms, the additional data can be recovered by the watermark detector, even after extensive signal processing operations. The watermark detector needs the 'secret key' of the watermark embedder to make detection possible. For this reason, it is practically impossible for anyone

who does not have access to this key to remove the watermark without causing severe picture quality degradation.

Digital Watermarking & Broadcast Verification

Digital watermarking is an innovative solution that is highly valuable to content owners, producers, post-production houses and broadcasters throughout the world. Digital watermarks are imperceptible codes inserted into broadcast video and audio that can be detected through the use of specialized hardware or software. They enable the accurate tracking of content when it is distributed and broadcast.

In the broadcast verification application of digital watermarking technology, a watermark is imperceptibly embedded into video content at the time of production or broadcasting. Digitally watermarked content is then tracked through a broadcast verification service that utilizes special hardware and software housed in monitoring stations in a variety of locations across the world.

The use of digital watermarks enables content rights-holders to know where, when, and for how long their content airs, and can be reported with additional information such as identification of the content producer, time and date of production.

Watermarking Technology & Broadcast Verification Services

Content owners use broadcast verification services to exercise control over creative assets, manage and protect content, manage decision-making and for campaign planning purposes. They have a need for their content to be accurately tracked in order to gain a precise understanding of how their creative material performs in the broadcast marketplace.

Watermarking technology is used in conjunction with broadcast monitoring services, for a number of different reasons, by a variety of different industries:

Programming Industry

Programmers use broadcast monitoring services to ensure contractual accountability, determining if specific programming aired in its entirety and according to schedule; as a promotional analysis tool to track television, movie and radio promotions; and for asset protection, helping provide legal verification of ownership.

News Industry

News organizations use broadcast monitoring services for inventory control and asset management. Broadcast monitoring can be used as a management decision tool enabling news producers, stations and networks to determine which items to feed to affiliate stations, and as a proof of performance tool determining which clients air specific news segments.

Advertising Industry

Broadcast monitoring services are used by advertisers to confirm ads aired according to contract and in their entirety, allowing advertisers the ability to calculate campaign effectiveness and return on investment and perform campaign analysis in order to maximize promotional impact.

Sports Industry

Detection and tracking results of

sport highlight packages, live sporting events or archives allows sports right holders to determine where and how their sports video materials are being used and reveals the hidden promotional value of their televised assets. Content airplay verification provides content owners, rights holders and sponsors with indisputable proof of broadcast and demonstrates the true reach of televised assets. This knowledge can be used to develop new business relationships, leverage audience access and maximise impact for brands.

Motion Picture Industry

Broadcast monitoring services can be used in the motion picture

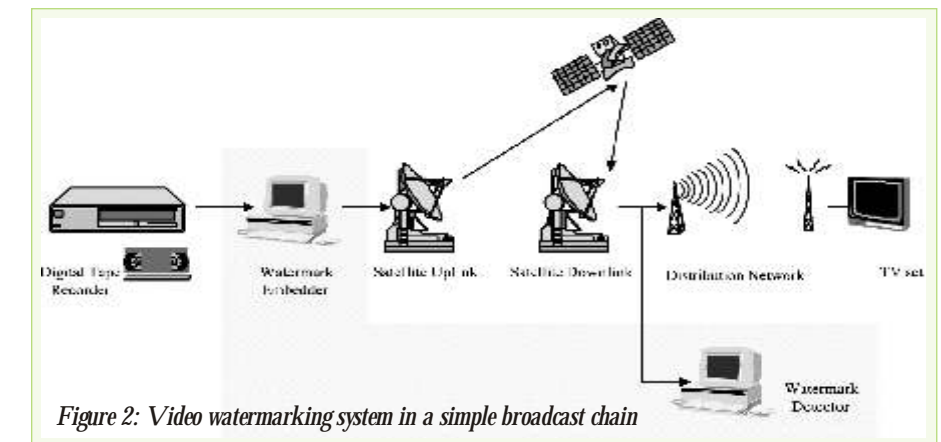


Figure 2: Video watermarking system in a simple broadcast chain

industry to protect theatrical movie releases from content piracy, and to compute royalties owed to actors.

Rights Management & Asset Protection

Broadcast monitoring enables content owners to identify the misappropriation of broadcast

assets, providing intellectual property protection and legal verification of ownership

Digital watermarking is a proven technology that is becoming increasingly deployed across the media, entertainment, advertising, news and sport industries. Digital watermarks combined with a global monitoring network and broadcast verification services enable content providers such as motion picture and music studios, TV syndicators, news, sports organizations and advertisers to exercise tight control over assets and precisely understand content usage while alleviating the issue of security, without having to lock or authorise

access to the content. It is becoming an intrinsic part of the broadcast chain and helps deliver increased revenue and improve return-on-investment.

About the Author

Andy Nobbs is President of Teletrax, the global media intelligence service. This service helps content providers, such as motion picture studios, entertainment program producers and distributors, news and sports organizations to evaluate the reach and performance of their video assets around the world. Formerly Content Director at IPC Media, and having held executive positions at Granada TV and EMAP, Nobbs has appeared in print in the Financial Times, The Hollywood Reporter, C21Media, Broadcasting & Cable and Television Week. He is also a frequent speaker at international trade shows.