

Use of RMI in the Online Delivery of Audiovisual Content: Need for Content Identification and Policy-based Response Infrastructures – phew!

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Some players

- ❖ Content Owners



- ❖ Content Network Operators



- ❖ Content Service Providers



- ❖ Search Engines



- ❖ Consumers



- ❖ Becoming an online media mogul

Content Service Providers

- ❖ Proliferation of different Internet-based content distribution channels for A/V content
 - Internet Streaming Sites (youTube, DailyMotion, etc)
 - Video on-demand/Digital To Own services (iTunes, Glowria, SF Anytime, etc)
 - P2P downloads (BitTorrent, in2movies, etc)
 - P2P Streaming (Joost, etc)
- ❖ Different business models are supported
 - Ad-supported (free to consumers)
 - Rentals
 - Subscriptions
 - Download-to-own
- ❖ Legal/Copyright issues
 - Exceptions/Fair use/Levies
 - Right Clearance/Remuneration
 - Exhaustion
 - Interoperability/Labelling
 - Privacy



Search Engines

- ❖ Search engines are primary mechanisms for content/information discovery on the Internet
- ❖ Specialized video search services represent next generation of search for A/V content
- ❖ Copyright issues – other people's content
- ❖ Current mechanisms to communicate policies to search engines are ineffective
 - Are coarse-grained (typically page or site-level policies); no ability to set policy by specific piece of content
 - Policy usage cases are limited; need finer expressions of authorized usage





Network Operators

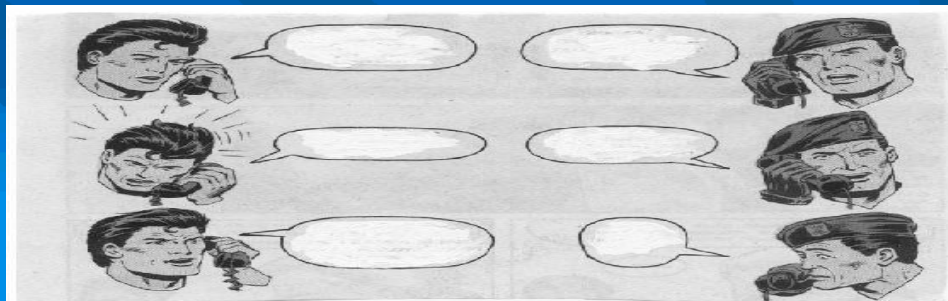


- ❖ Consumer demand for higher bandwidth growing exponentially as they switch to richer media (Text to Audio to Video)
 - Video now represents 33% of all Internet traffic
 - Internet video is 1000 times bigger than audio
- ❖ Internet video quality needs to improve, is expected to evolve to DVD- quality and eventually to High-Def video (which requires at-least 10x current bandwidth)
- ❖ Network operators are investing heavily to build additional bandwidth capacity
 - Need additional revenue streams (such as IPTV content services – PVR functionality) to recoup investment
 - Illegal p2p traffic hurts network operators by forcing investments in infrastructure while cannibalizing potential revenue channels such as IPTV



Communication Challenges

- ❖ Difficult to automate communication of metadata and policy across different players in the legitimate content ecosystem
 - Lack of standardized Content Identifiers
 - Lack of standardized expressions of policy associated with content
 - Existing methods to recognize content (File names, ID3 tags etc) are not robust
 - Policies differ over time, geography, content owner, content service provider, etc



Content Identification and Response

All constituents in the legitimate content ecosystem will benefit from the following capabilities:



- ❖ Robust mechanisms to identify content
- ❖ Standardized expressions of policy-based responses when content is identified; Whitepaper published by DCIA identifies usage cases for response:
 - Substituting one identified file for a different version of the file or related information
 - Enabling a transaction, authorizing the use of, or otherwise monetizing the particular use of the file (through advertising, subscription, paid download or other means)
 - Enhance experience by enabling access to related materials
 - Allowing or blocking the re-transmission of a file



Content Identification Technologies

❖ Metadata

- Includes global content identifiers and metadata eg ISAN



❖ Hashes

- A unique alphanumeric string based on the contents of the file; changing a single bit changes the hash



❖ Fingerprints

- An identifier for a digital file computed, like a hash, based on the data in the file. Audio and video fingerprints result from formulas applied to audio and video data
- Two core components: a method to generate fingerprints, and a method to look at a pair of fingerprints and reliably determine if the two files that were the source of the two fingerprints represent the same content.



❖ Watermarks

- Identifiers that are embedded in the video or audio data at some point in the distribution chain
- Watermarks tends to be robust and survive common content transformations

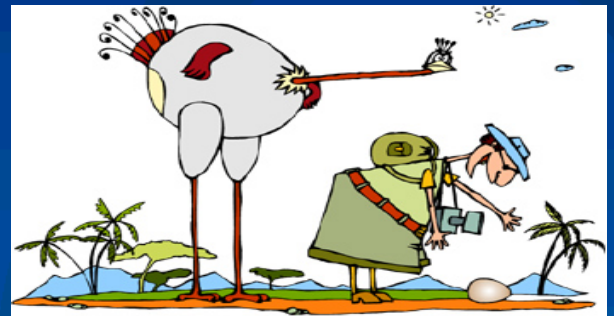


- [Microsoft Patents "Stealthy Audio Watermarking"](#)

Content Identification Technologies

Mainstream and commercially deployed!

- ❖ Metadata and Hash deployments
 - p2p networks for content discovery
 - "scanning services" that help filter
- ❖ Fingerprinting deployments to filter content include ISPs, Universities, Municipalities, and UGC sites
- ❖ Watermarking Deployments include
 - Forensic marking: "screener" DVD, IPTV STB, etc
 - Playback control: AACS protected Blu-Ray and HD-DVD discs



Content Usage Policy Technologies

Examples include:

- ❖ ACAP
 - A “standard” mechanism to communicate policy to search engines
- ❖ Copy Control Information
 - Various forms in FTA broadcasts and Cable/Satellite systems
- ❖ SMPTE ExCCI
- ❖ DVB CPCM Usage State Information
- ❖ Proprietary methods associated with DRM schemes
 - Usually part of the DRM license
- ❖ Proprietary methods associated with content service providers
 - Service specific database that holds rights information based on commercial deals with content owners; rights not held with content



DVB

Summary

- ❖ AV content sector is involved in a number of initiatives that will help unlock the potential of the online video marketplace by helping content owners and content network operators clearly communicate and enforce authorized usages
- ❖ All the constituents in this ecosystem have a part to play – we thank them for their interest in participating, and look forward to continued efforts to define and deploy content identification and policy-based response infrastructures