Rajan Samtani, Senior Advisor
Introduction to Digital Watermarking

– Digital Watermarking is a signal processing technique to embed a pattern of bits dispersed into the digital image, video or audio content

– Digital Watermarks are designed to be imperceptible to the human eye, or in the case of audio clips, to be inaudible to the human ear

– The main purpose of digital watermarks is to provide forensic track and trace capabilities to deter unauthorized distribution of high value digital content

  – The actual data bits representing the watermark are usually dispersed inside the file such that they cannot be easily identified and manipulated
  
  – Digital watermarks must be robust enough to withstand normal changes such as format conversions, lossy compression, as well as D to A changes

  – Special detection software is needed to extract and decode the watermark

NOTE: DIGITAL WATERMARKING IS NOT A VISIBLE OVERLAY
Digital Watermarking Requires Trade-Offs and Optimization

- **Perceptibility:** Variable human sensory perceptions between experts and novices (visual and auditory)
- **Robustness:** Ability for the watermark to survive many different signal processing alterations (compression, D to A and A to D, Geometric distortion, etc.)
- **Data Rate:** Amount of information required in the payload
- **Computational Complexity:** Cycles available at the embedder and the detector for low latency insertion and scalable detection
- **Security:** Ability to withstand attacks from malicious actors (Protocol attacks, Statistical attacks)
- **Bandwidth and Storage Overhead:** Different watermarking techniques require different levels of overhead
- **Encode/Decode Requirement:** Some watermarking techniques require a full decode and re-encode, others require partial, yet others don’t require any decode/re-encode steps
- **Blind Versus Non-Blind Detection:** Different watermarking techniques require different levels of knowledge about the original content

Satisfying all these requirements requires heavy investment in R & D

DIGITAL WATERMARKING ALLIANCE
History of Watermarking Initiatives

1995 Image Watermarking

1998 SDMI (Failed!!!)

2000 Broadcast Monitoring

2003 Music & Video Pre-Release

2005 SMPTE DCI & Post Production

2009 RIAA Watermarking Standard

2010 Early Window Experimentation

2014 MovieLabs ECP 4K/UHD Guidelines
2017 Will Be A Landmark Year For Watermarking

- MovieLabs Published the Enhanced Content Protection Guidelines document for 4K UHD Content in 2014
- Forensic Watermarking is now a “requirement” for licensing of UltraHD and early window content
- This was the catalyst for the rest of the ecosystem to be involved, including broadcasters, OTT distributors, SoC manufacturers, encoding vendors
- Today, several solutions are available that can support the UHD-1 specs including HEVC, HDR
- Important standards/best practices efforts are underway at UHD Forum and within the DWA
DWA’s Membership and Role in the Ecosystem

Charter

The Digital Watermarking Alliance (DWA) is a group of companies which are actively involved in commercialization of Digital Watermarking-based Applications, Systems and Services, and share a common interest in furthering the adoption of digital watermarking globally.

Mission

The mission of the DWA is to create awareness and promote the value of digital watermarking to content owners, industry, policy makers, and consumers.

www.DigitalWatermarkingAlliance.org

Whitepapers • Resources • Information
Get Ready To Hear From Your Potential Partners

You will now have a chance to review each of our member profiles

*Please Note:* They **all** love long walks on the beach!!
ContentArmor video watermarking in a nutshell

A unique watermarking technology
- Only solution operating directly on the bitstream
- Secure and renewable solution
- Can be easily integrated at any place in the workflow

A recognized solution
- Tested and used by several Hollywood studios
- Robustness successfully appraised by several major Conditional Access vendors

Adapted to multiple usages, from Content Creation to End-Users distribution
On demand watermarking for every step of content production

- Safestream is an on-demand watermarking with flexible templating and dynamic data fields for Pre-Release market

- It individualizes content catalogs in real-time so each stream is unique to a user

- MediaSilo and ContentArmor have partnered to offer forensic watermarking as an option of the service

ContentArmor benefits
- Forensic marks are seamlessly added « on demand » simultaneously to visual marks

- Forensic watermarking can be used earlier in the supply chain and not be limited anymore to internal or external screeners
Introduction

What’s our story

- Just went through a breakup
  - Broke up with Civolution and was acquired by The Kudelski Group in July 2016
- Why was Kudelski so attracted to us
  - To have an additional anti-piracy tool to sell to their existing customers (the operators)
  - To strengthen their solution offering to video streaming providers
  - To strengthen their relationship with original content owners
- Leader in forensic watermarking
Why choose NexGuard?

- Our customers have chosen us
  - All the major studios
  - Original content providers
  - PayTV providers
- Unfair advantage
  - **Our Looks/Imperceptibility** – validated by major Hollywood studios & PayTV operators
  - **Our Personality/Robustness** – proven against severe degradation of the content
NexGuard Solutions

Protecting the entire media lifecycle

- From birth
  - Pre-Release and e-Screener watermarking
- To going out in the world
  - Digital Cinema watermarking
- To old age
  - PayTV watermarking for both linear broadcast (STB) and digital streaming (OTT)
Protecting What’s important

Looking out for your daughter

- Complete end to end security
  - CAS and DRM
  - Watermarking
  - Monitoring and Enforcement
- Protect content
- Find it when it leaks
- Trace it to whoever leaked it
Thank You

Looking forward to dating you and taking long walks on the beach!!!
MarkAny's Forensic Digital Watermark

Content TRACKER™
WHO WE ARE  MarkAny

20 Years
Experience in Cyber Security

3,000 +
References in South Korea, US, Japan and China

150 +
Global Patents
**KEY WORDS** Content TRACKER™

- **8K UHD**
  - 8K UHD Resolution Support

- **1 Trillion+**
  - 1 trillion+ sessions or users identification

- **Real Time**
  - Real time embedding

- **Fast**
  - Fast implementation and integration (1 month avg.)

- **Robust**
  - Industrial Standard Compliant

- **Customized**
  - Algorithm-based Customized solution tailored to each client’s needs
**KEY BENEFITS** Content TRACKER™

- **30**
  - End-to-End Delivery
  - Lead Time

- **Atom**
  - On-Demand
  - Detection Support

- **Handshake**
  - And many more..
KEY SERVICES Content TRACKER™

Content TRACKER™ Streaming
OTT and Premium Live Content Streams

Content TRACKER™ Pay TV
4K UHD PayTV and SmartTV
Thank You
Irdeto TraceMark™ Overview

Content Protection Summit
Marina Del Ray
December 7 2016
Introducing Irdeto TraceMark

• Irdeto TraceMark™ forensic watermarking that is field proven
• **Distributor watermarking** seamlessly protects high quality content from content owner to distributor (pay TV, electronic sell-through, retail, etc.)
• TraceMark™ embeds an invisible, robust mark that uniquely identifies each stream
Irdeto provides a 360° View of Content

Irdeto Products
- Secure Authoring House
- Watermark Embedder
  - HD50
  - ProRes
  - XDCAM
- Aspera
- Watermark Switcher
- Watermark DB
- Distributors
- Subscriber
- Pirated Content

Irdeto Services
- Pirate sites
- Discovery
- Analyze
- Verify
- Watermark Detector
- Source Identification/Shut Down
- Enforcement Activities
- Reporting
Expansive Global Protection

OPERATORS
850 OPERATORS
Protected by VCAS

SCREENS
110 MILLION
Protected by VCAS

COUNTRIES
110+ COUNTRIES
Deployed and supported
Integrated Watermarking since 2005

- MultiRights OTT
- Verspective
- VCAS for Broadcast Hybrid
- VCAS for DVB Hybrid
Large footprint
- 2005 pioneering client side integration in STB
- today: HW SOC integration with 9+ SOC vendors

Secure
- Integration with decryption in TEE to comply with MovieLabs requirements

UHD / HDR and Live content
- Flexible optimization for requirements of extraction speed and highest quality
Ease of Integration

• Verimatrix VideoMark® and StreamMark ® enable client and server embedding depending on network, delivery and client device

Full Circle

• Partners for monitoring and investigations
Thank you.
GLOBALLY TRACKABLE, SECURE CONTENT DISTRIBUTION AUDIO, VIDEO & IMAGE
GLOBALLY TRACKABLE, SECURE CONTENT DISTRIBUTION
AUDIO, VIDEO & IMAGE

Track & Trace Monitoring, Source Detection, Business Intelligence & Takedowns
### Top 10 Link sites

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of links</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>vodlocker.com</td>
<td>6,371</td>
<td>Stream</td>
</tr>
<tr>
<td>thevideo.me</td>
<td>5,283</td>
<td>Stream</td>
</tr>
<tr>
<td>openload.co</td>
<td>5,220</td>
<td>Stream</td>
</tr>
<tr>
<td>vidzi.tv</td>
<td>4,890</td>
<td>Stream</td>
</tr>
<tr>
<td>vidbull.com</td>
<td>4,565</td>
<td>Stream</td>
</tr>
<tr>
<td>uploaded.net</td>
<td>4,487</td>
<td>Download</td>
</tr>
<tr>
<td>rapidgator.net</td>
<td>4,304</td>
<td>Download</td>
</tr>
<tr>
<td>streamin.to</td>
<td>3,910</td>
<td>Stream</td>
</tr>
<tr>
<td>vidto.me</td>
<td>3,621</td>
<td>Stream</td>
</tr>
<tr>
<td>allmyvideos.net</td>
<td>3,294</td>
<td>Stream</td>
</tr>
</tbody>
</table>

### Top 10 Host sites

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of links</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>watchepisodes.co</td>
<td>20,951</td>
<td>Stream</td>
</tr>
<tr>
<td>watchseriesfree.to</td>
<td>19,226</td>
<td>Stream</td>
</tr>
<tr>
<td>the-watch-series.to</td>
<td>10,411</td>
<td>Stream</td>
</tr>
<tr>
<td>watchvlinks.me</td>
<td>4,948</td>
<td>Stream</td>
</tr>
<tr>
<td>movie4u.club</td>
<td>4,828</td>
<td>Stream</td>
</tr>
<tr>
<td>scnsrc.me</td>
<td>3,846</td>
<td>Download</td>
</tr>
<tr>
<td>watchseries.ac</td>
<td>3,522</td>
<td>Stream</td>
</tr>
<tr>
<td>torrentroom.com</td>
<td>3,309</td>
<td>Download</td>
</tr>
<tr>
<td>2ddl.io</td>
<td>2,954</td>
<td>Download</td>
</tr>
<tr>
<td>primewire.ag</td>
<td>2,468</td>
<td>Stream</td>
</tr>
</tbody>
</table>

### Status of links (Up/Down)

#### Top 10 sites: site traffic

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of visits</th>
<th>US Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>the-watch-series.to</td>
<td>60,800,000</td>
<td>1 (27%)</td>
</tr>
<tr>
<td>watchseries.ac</td>
<td>58,200,000</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>primewire.ag</td>
<td>51,200,000</td>
<td>1 (48%)</td>
</tr>
<tr>
<td>watchseriesfree.to</td>
<td>6,700,000</td>
<td>1 (28%)</td>
</tr>
<tr>
<td>scnsrc.me</td>
<td>3,600,000</td>
<td>1 (24%)</td>
</tr>
<tr>
<td>2ddl.io</td>
<td>3,000,000</td>
<td>2 (19%)</td>
</tr>
<tr>
<td>torrentroom.com</td>
<td>850,800</td>
<td>1 (9%)</td>
</tr>
<tr>
<td>watchepisodes.co</td>
<td>260,000</td>
<td>1 (18%)</td>
</tr>
<tr>
<td>movie4u.club</td>
<td>182,000</td>
<td>1 (15%)</td>
</tr>
<tr>
<td>watchtvlinks.me</td>
<td>35,000</td>
<td>3 (15%)</td>
</tr>
</tbody>
</table>

#### Top 25 Host sites

![Diagram showing Top 25 Host sites]
SCALABLE SECURE CLOUD INFRASTRUCTURE

• Encryption At Rest & During Transmission
• URL Protection: Media links lock to device
• Malware Scanning
• Adaptive Streaming to all devices
• Transactional Forensic Watermarks for ALL MEDIA FORMATS (Audio, Video, Images)

• Worldwide Performance Centers
• Personal Portal for Distribution and Monitoring
• Anti-Piracy Research Portal
• Active Directory Integration
• Full API Available