Advanced Access Content System (AACS)

AACS Overview
Presentation to CPTWG

Presented by
Michael Ayers
July 22, 2009
AACS LA presented its Interim specifications and licenses to CPTWG in February 2006 – AACS LA remained consistent with our original plan.

Current Status

Features of the Final Specifications

Licensing Considerations
AACS LA Structure

Founders - drawn from 3 key industry sectors: content providers, consumer electronics and IT industry
- IBM
- Intel
- Microsoft
- Panasonic
- Sony
- The Walt Disney Company
- Toshiba
- Warner Bros.

Contributors
- Input and collaboration with 15 additional companies across principal industries

Licensees
- Manufacturers, Content Companies, Resellers, Online Service Providers

Cost Recovery; No paid staff; Outsourced services
AACS Technology Objectives

- **Create a seamless, robust and interoperable environment for the distribution and use of next-generation digital content**
  - Develop, promote and license technologies designed to enhance digital entertainment experiences for consumers
  - Exciting, flexible new entertainment options for consumers in stand alone, networked home and portable environments
  - Solution is format-neutral and designed for the next-generation optical media formats, Blu-ray and HD DVD, for use with PCs and other consumer electronics devices

- **Create opportunities for new business models for content providers, distributors, content aggregators and device manufacturers**
  - Enables e-commerce enhanced content while accelerating the legitimate flow of next generation content, including high definition (HD) content
  - Gives content providers new distribution management options for consumer-friendly authorized use

- **Provide a core entity to license the technology**
  - Strong partnership among the IT, Entertainment, and CE industries
Extended Business Opportunities

Local Playback

Electronic Distribution with Secure Copy

Home Media Server

Portable Device
AACS Framework

AACS: Advanced, format-neutral protection for next generation audiovisual content for a variety of underlying formats*

Legacy Format

- Standard Def
- CSS
- DVD-9

Advanced Format

- High Definition
- AACS
- HD DVD
- Blu-ray Disc
- Other formats**

*Prerecorded and Recordable
** CBHD added
AACS Technology Review

- **Strong cryptography**
  - Advanced Encryption Standard with 128-bit keys
  - Next-generation media key block
- **Revocation of compromised devices**
  - Precise – affects only compromised key
  - Efficient tree-based, broadcast encryption
- **Enhanced drive authentication**
- **Support for advanced operations such as “move”**
- **Use of network connectivity to enable enhanced uses**
- **New approaches to enhance robustness of implementations**
  - Combination of proactive software renewal with revocation
- **Audio Watermark**
Hundreds of interim licenses in force
Encryption system is robust
Key renewal and revocation processes work and are routinely used
Key generation processes have been improved and key order delivery times have dropped
Key order fees have been reduced as costs have been lowered
Development of the Final specifications and licenses was more complicated than expected, but are now posted on www.AACSLA.com
AACS Licensing Status

- Interim Licensing began on Feb. 17, 2006
- Final Adopter & Content Participant Agreements published June 5, 2009
  - Final Content Provider & Reseller Agrmts. published June 19, 2009
  - Online Service Provider Agreement being prepared
  - Transition period – Interim Agreements expire Dec. 4, 2009
- Format Rollout:
  - Blu-ray – All provisions of the Final Licenses
  - HD DVD – Final, except MC and WM; Market Monitoring to be done by AACS
  - CBHD – Interim until December 2010
Outcomes of the Review Steps

- Founders and Contributors provided input on the Specs, Licenses and Compliance Rules
- Besides new features, the review process yielded improved documents and processes
- The improved process areas include:

<table>
<thead>
<tr>
<th>Re-pressing of existing titles</th>
<th>Obligations re. Managed Copy</th>
</tr>
</thead>
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<tr>
<td>Transfer rules for CMF’s</td>
<td>Use of Content Certificates</td>
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<td>Fee Structure</td>
<td>Production Reporting</td>
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<td>Volume CP notification</td>
<td>ICT/DOT responsibilities</td>
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<td>BD Live data transfer procedures</td>
<td>AACS KGF service levels</td>
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</table>
Final Licenses – New Features

- Managed Copy
- Watermark embedding and detection
- Digital Only Token enabled
- Prepared Video
- Class II MKB’s
- Bus Encryption

- Analog Sunset Dates
- Slightly modified key expiration terms
- Third-Party Product Certification
- Signed CSS
  - Watermark
  - Content certificate
- Revised Fee Structure
Managed Copy

Managed Copy

Enable authorized copies and movement of content onto home network and portable devices

Specifications allow first generation (Interim) AACS-protected discs to be Managed Copy-ready

Current authorized Managed Copy output technologies include CPRM, VCPS, WMDRM/PlayReady, MagicGate, AACS for Recordable Media, as well as AACS Prepared Video

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Prepared Video

- New AACS writable format
  - Supports preservation of all features of a pre-recorded disc (navigation, etc.)
    - Disc is enabled through cryptographic token created by a Content Owner server
  - Enables Electronic Sell Through and Manufacturing On Demand models
  - Can be used as an input and/or output technology for Managed Copies
  - AACS for Prepared Video supports bit-for-bit HD copies, and AACS LA looks forward to BDA support for this functionality
Audio Watermark

- Selected watermark technology is from Verance Corporation – referred to as the Cinavia™ Watermark
- Embedded at the discretion of content providers
- Final license obligation is on device manufacturers to screen for the watermark
- Inaudible signal that a content provider may choose to insert into the audio track of their content
- Invisible and inaudible to consumers
- Two uses of the watermark
  - No Home Use – embedded in theatrical releases only
  - Trusted Source – embedded in AACS-protected optical discs and other trusted content delivery methods to consumers
- Licenses and specifications available from Verance Corporation
  - www.verance.com
Digital Only Token

- Digital Only Token will be utilized **only** to enable new business models for content offerings
  - *e.g.*, “Day and date” release of disc and theatrical versions
  - *e.g.*, HD preview of content before generally available
  - *e.g.*, screeners and other non-consumer uses
- When used, restricts content to digital outputs
- If employed, disc required to be clearly labeled to avoid consumer confusion
- Encourages industry use of protected digital interconnections and enhanced security
Applicable to analog outputs

Provides better than current Standard Definition DVD experience for legacy analog devices
  
  - Resolution superior to current DVDs, twice the resolution of standard definition

Encourages adoption of protected digital interconnections

Provides flexible business options for content owners

Obligation to notify consumer when ICT used on disc

Employed at the option of the content owner
Drive-Host Bus Encryption

- Adds a dynamic encryption layer for PC-based players
  - See Specification Common Book – Chapter 4
  - Prevents decryption of content extracted from drive-host interface, even if certain AACS keys are known
- Adds second layer of encryption between software host and PC-based drive
- Uses dynamic keys
- Forces attackers to have a revocable host private key and certificate in their client, making identification (and revocation) easier
Class II Media Key Blocks (MKBs)

- Also known as “Unified MKBs”
  - See Specification Common Book – Chapter 3
  - Strengthens ability to respond to clone and anonymous attacks (discovering source of the attack)
  - Combines benefits of Sequence Keys with modified MKB structure
  - Offers lower implementation cost over Class I MKBs/SKBs
    - Class II devices no longer need process SKBs
  - Backward-compatible with the SKB system
Analog Sunset

- Addresses balance between content protection needs & realistic timeframe for digital output adoption
- December 31, 2010 – analog output limited to SD Interlace Modes only (i.e., Composite, S-Video, 480i component)
- December 31, 2013 – sunset for all analog output
- No impact on Licensed Products manufactured prior to sunsets
Signed CSS

- New Signed CSS book defines format for CSS certificates for use with DVD
  - Allows Content Owners to place AACS Watermarks on content which is only protected with CSS
  - If an AACS player sees the Trusted Source watermark on an optical disc which does not include the certificate, the player will mute the audio
Fees

- Order process fee reduced for all key order types
  - Now $500 (50% reduction)
  - Extensive competitive bid process resulted in movement of key generation facility to a new hosting vendor
- Lower fees for content companies
  - On average at least 25% reduction
- New provisions for small content companies
  - New Content Provider annual fee option for small production consortia
- More streamlined payment and accounting process for both content owners and content producers.
  - Content Participants and Content Providers responsible for reporting and fee payment
  - AACS LA retains audit rights
AACS Fee Reduction

- **Annual Administration Fee for Basic Content Provider**
  - **Interim Agreement:**
    - US$3,000 (for the life of the Agreement)
  - **Final Agreement:**
    - US$3,000 (for the life of the Agreement) or
    - US$500/year with the cap of US$5,000

- **Optical Media Fee (Per Disc)**
  - No Change from Interim to Final: US$0.04/disc

- **Optical Media Fee (Annual Volume Plan)** – See the Tables in the Following Page
  - Create new tiers to cover lower production volumes
  - Reduction is applied throughout the tiers

- **Content Certificate**
  - **Interim Agreement:** Originally US$2,500/title, reduced to US$1,300/title
  - **Final Agreement:** US$500/title (80% reduction over 3-year span)
## Interim Agreement

<table>
<thead>
<tr>
<th>Tier</th>
<th>Minimum Annual Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 500K</td>
<td>US$12,000</td>
</tr>
<tr>
<td>0 - 2M</td>
<td>US$40,000</td>
</tr>
<tr>
<td>0 - 5M</td>
<td>US$80,000</td>
</tr>
<tr>
<td>0 - 15M</td>
<td>US$200,000</td>
</tr>
<tr>
<td>0 - 70M</td>
<td>US$600,000</td>
</tr>
<tr>
<td>0 - 120M</td>
<td>US$1,400,000</td>
</tr>
<tr>
<td>0 - 170M</td>
<td>US$1,900,000</td>
</tr>
<tr>
<td>0 - 250M</td>
<td>US$2,300,000</td>
</tr>
<tr>
<td>250M -</td>
<td>US$2,500,000</td>
</tr>
</tbody>
</table>

## Final Agreement

<table>
<thead>
<tr>
<th>Tier</th>
<th>Minimum Annual Fee</th>
<th>Additional Per Disc Rate</th>
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<tbody>
<tr>
<td>0 to 200k</td>
<td>US$ 7,200.00</td>
<td>US$ 0.036</td>
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<tr>
<td>0 to 500k</td>
<td>US$ 12,000.00</td>
<td>US$ 0.0240</td>
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<tr>
<td>0 to 1M</td>
<td>US$ 20,160.00</td>
<td>US$ 0.0202</td>
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<tr>
<td>0 to 2M</td>
<td>US$ 34,474.00</td>
<td>US$ 0.0172</td>
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<tr>
<td>0 to 5M</td>
<td>US$ 70,671.00</td>
<td>US$ 0.0141</td>
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<tr>
<td>0 to 10M</td>
<td>US$ 121,554.00</td>
<td>US$ 0.0122</td>
</tr>
<tr>
<td>0 to 20M</td>
<td>US$ 211,504.00</td>
<td>US$ 0.0106</td>
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<td>0 to 30M</td>
<td>US$ 291,875.00</td>
<td>US$ 0.0097</td>
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<td>0 to 45M</td>
<td>US$ 405,707.00</td>
<td>US$ 0.0090</td>
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<td>0 to 60M</td>
<td>US$ 513,895.00</td>
<td>US$ 0.0086</td>
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<td>0 to 80M</td>
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<td>250M -</td>
<td>US$ 1,800,000.00</td>
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</table>
### Scenario 1
Content Participant releases 20 titles/4 Million discs annually.

### Fee Schedule under Interim Agreement
- **Admin Fee:** $40,000.00/year
- **MKB fees:** 20 MKBs @ $10/MKB
- **MKB usage @ Volume plan:** $80,000.00
- **Content Certs:** 40 Certs @ $500.00
  (assuming 2 Certs per title, to account for “do overs”)
- **40 Order Fulfill Fees:** @ $800.00 (2 Certs per title, for “do overs”) $32,000.00

**TOTAL:** $172,200.00

### Fee Schedule under Final Agreement
- **Admin Fee:** $40,000.00/year
- **MKB fees:** 20 MKBs @ $5/MKB
- **MKB usage:** N/A
- **Content Certs:** Cert usage @ Volume plan
  (“do overs” not relevant here) $68,874.00
- **40 Order Fulfill Fees:** @ $500.00 (2 certs per title, for “do overs”) $20,000.00

**TOTAL:** $128,974.00

### Savings of 25.1% over Interim Fee Schedule
Scenario 2  Volume Content Provider releases 5 titles/1.5 Million discs annually.

Fee Schedule under Interim Agreement
- Admin Fee: $15,000.00/year $15,000.00
- MKB fees: 5 MKBs @ $10/MKB $50.00
- MKB usage @ Volume plan: $40,000.00
- Content Certs: 10 Certs @ $500.00 $5,000.00
  (assuming 2 Certs per title, to account for “do overs”)
- 10 Order Fulfill Fees: @ $800.00 (2 Certs per title, for “do overs”) $8,000.00

TOTAL: $68,050.00

Fee Schedule under Final Agreement
- Admin Fee: $15,000.00/year $15,000.00
- MKB fees: 5 MKBs @ $5/MKB $25.00
- MKB usage: N/A
- Content Certs: Cert usage @ Volume plan $30,260.00
  (“do overs” not relevant here)
- 10 Order Fulfill Fees: @ $500.00 (2 certs per title, for “do overs”) $5,000.00

TOTAL: $50,285.00

Savings of 26.1% over Interim Fee Schedule
Scenario 3  Basic Content Provider releases 1 title/25,000 discs annually.

Fee Schedule under Interim Agreement

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>1st year</th>
<th>2nd year and later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin Fee: $3,000.00 (for the life of the Agreement)</td>
<td>$3,000.00</td>
<td>N/A</td>
</tr>
<tr>
<td>MKB fees: 1 MKB @ $10/MKB</td>
<td>$10.00</td>
<td>$10.00</td>
</tr>
<tr>
<td>MKB usage: @ $0.04/disc</td>
<td>$1,000.00</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Content Certs: 2 Certs @ $500.00</td>
<td>$1,000.00</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>(assuming 2 Certs per title, to account for “do overs”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Order Fulfill Fees: @ $800.00 (2 Certs per title, for “do overs”)</td>
<td>$1,600.00</td>
<td>$1,600.00</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>$6,610.00</td>
<td>$3,610.00</td>
</tr>
</tbody>
</table>

Fee Schedule under Final Agreement

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>1st year</th>
<th>2nd year and later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin Fee: $3,000.00 (for the life of the Agreement)</td>
<td>$3,000.00</td>
<td>N/A</td>
</tr>
<tr>
<td>MKB fees: 1 MKB @ $5/MKB</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>MKB usage:</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Content Certs: @ $0.04/disc</td>
<td>$1,000.00</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>(“do overs” not relevant here)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Order Fulfill Fees: @ $500.00 (2 certs per title, for “do overs”)</td>
<td>$1,000.00</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>$5,005.00</td>
<td>$2,050.00</td>
</tr>
</tbody>
</table>

Savings of 24.3% over Interim Fee Schedule for the 1st year and 43.2% for the 2nd year and later.
**Scenario 4**  
Basic Content Provider releases 1 title/1,000 discs only once.

**Fee Schedule under Interim Agreement**
- Admin Fee: $3,000.00 (for the life of the Agreement)  
  $3,000.00
- MKB fees: 1 MKB @ $10/MKB  
  $10.00
- MKB usage: @ $0.04/disc  
  $40.00
- Content Certs: 2 Certs @ $500.00  
  (assuming 2 Certs per title, to account for “do overs”)  
  $1,000.00
- 2 Order Fulfill Fees: @ $800.00 (2 Certs per title, for “do overs”)  
  $1,600.00

**TOTAL:**  
$5,650.00

**Fee Schedule under Final Agreement**
- Admin Fee: $500.00/year  
  $500.00
- MKB fees: 1 MKB @ $5/MKB  
  $5.00
- MKB usage:  
  N/A
- Content Certs: @ $0.04/disc  
  (“do overs” not relevant here)  
  $40.00
- 2 Order Fulfill Fees: @ $500.00 (2 certs per title, for “do overs”)  
  $1,000.00

**TOTAL:**  
$1,545.00

**Savings of 72.7% over Interim Fee Schedule.**
Final License Elements

- Similar in structure to other content protection technology licenses and the AACS Interim Agreements
  - Patent IP license from each Founder
    - Necessary Claims
  - Non-assert from each Licensee to every other Licensee, as well as to Founders and AACS LA, LLC
    - Provides “litigation-free zone” for all licensees
    - Non-assert limited to Necessary Claims within scope of Specifications
  - Non-patent IP license from AACS LA, LLC
    - Copyright in Specs
    - Trade secrets
Final License Elements (cont.)

- License election
  - Evaluation License for evaluation of AACS Technology & product development
  - Production License for production of devices/components for sale
- Authoring/Mastering using AACS Technology is licensed for “Licensed Content Producer” under Adopter Agreement
  - Stamping is accommodated under Content Participant Agreement/Content Provider Agreement
  - AACS Online Service (including development and operation of AACS Managed Copy Servers) will be licensed under Online Service Provider Agreement
- Provision for “Have Made” Parties
  - Facilitates licensee use of subcontractors

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Third-Party Certification

- Third-party review of pre-shipping Licensed Products
  - Sections 3.1 to 3.4 of the Adopter Agreement;
  - A check of Licensed Products for compliance and robustness prior to shipping, providing opportunity to identify problems before they show up in the field;
  - RFP for development of testing regimen provided to twelve candidates;
  - Structured as a two-phase implementation to get initial process in place as early as possible;
  - Current timeline calls for first phase of the program to be in place in early Q2 2010;
  - Comprehensive Robustness Review document produced, undergoing internal finalization.
Final License Elements (cont.)

- **Change Management**
  - Limited ability of AACS LA to make changes to Compliance Rules or Specifications
  - Some licensees have change management role
  - Licensee may terminate license in response to proposed change, freezing survival of non-assert at state of AACS Technology immediately prior to introduction of such change
Final License Elements (cont.)

- **Term/Termination of Interim Agreement**
  - 6 months after Final Agreement available – June 5, 2009
  - Effective Date of Final Agreement entered into by Adopter

- **Key Expiration/Renewal**
  - Keys can be Expired if cloned, lost, extracted or used in unauthorized distribution of Keys
  - Shared Keys must be proactively renewed
  - Expiration procedure can be initiated by AACS LA, Adopters or Content Participants
  - Adopter has right to object to Expiration
  - Final License has terms to make it more efficient to Expire keys under certain conditions
Summary

- AACS has been licensed by hundreds of licensees during the Interim licensing period.
- The Final Specifications and Agreements bring new function to consumers and additional content security for content owners.
- License process yielded process improvements for Content Producers.
- New, streamlined fee structure and reduced fees.
- AACS website is www.aacsla.com.
- Verance (Cinavia™) website is www.verance.com.

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