

“Analog Sunset” Demystified

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Abstract

This paper discusses and clarifies the issues surrounding the analog sunset and the implications for Blu-ray Disc players and commercially pre-recorded Blu-ray Discs. Additionally, this paper discusses cases where, especially for professional A/V applications, the provisions of the analog sunset do not apply. Awareness of how, when, and if the analog sunset will affect an A/V system will help designers and users choose the best mix of system components to suit their needs.

white paper

“Analog Sunset” Demystified

The term “analog sunset” has been used loosely to describe a major trend in the professional A/V industry – that of burgeoning digital video formats displacing analog video. The overwhelming majority of new video technology developments in display devices, video sources, and high resolution and 3D formats are digital in nature. In broadcast television, the United States has completely transitioned from analog NTSC broadcasts to digital ATSC. Digital ports such as HDMI, DVI, and DisplayPort are becoming standard on most video equipment.

However, analog sunset is also a narrowly defined, regulatory term whereby the performance and behavior of specific types of A/V equipment, namely Blu-ray Disc players and recorders, are restricted in a legally binding manner, and this term is not applicable to other equipment. Proper understanding of this regulatory term is important for the A/V professional to gain insight on which products have features that are legally required to be restricted by the analog sunset, and which products are not subject to these restrictions. With this understanding, A/V systems can be designed correctly, with the optimal choice of system components.

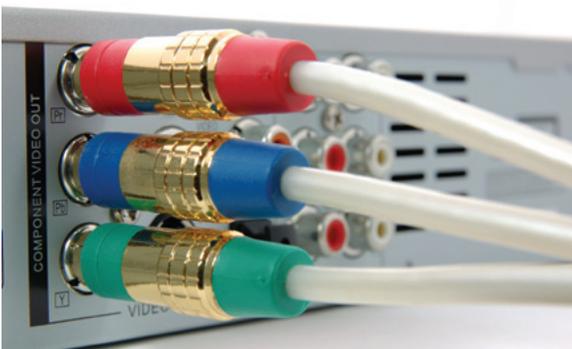
What is the Analog Sunset?

To be precise, the analog sunset is part of the Advanced Access Content System, or AACS license agreement. AACS is the encryption and digital rights management system adopted by content owners and device manufacturers to protect material recorded on Blu-ray Disc and HD DVD from illegal copying and distribution. With the termination of the HD DVD format in 2008, the only significant current adopters of AACS are organizations involved in the production of commercial Blu-ray Disc titles and playback devices.

Content owners are motivated to restrict the analog video outputs on Blu-ray Disc players because the relative ease of capturing analog video signals may facilitate illegal copying. AACS provides for two ways to limit analog outputs. The first is a hardware limitation obliged to be implemented by the manufacturers of the players, which is known as the analog sunset. The second limitation can be used by content producers, and comprise mechanisms known as the Image Constraint Token or ICT, and the Digital Only Token or DOT. Let’s first have a look at the hardware limitation by the manufacturer.

The term analog sunset appears and is described in Exhibit E, part 2, section 2.2.2 of the final AACS Adopter Agreement of June 2009:

2.2.2.1 Analog Sunset – 2010. With the exception of Existing Models, any Licensed Player manufactured after December 31, 2010 shall limit analog video outputs for Decrypted AACS Content to SD Interlace Modes only [composite video, S-video, 480i component video, and 576i video].



The analog sunset will impact the availability of analog component video output on Blu-ray Disc Players.

*2.2.2.2 **Analog Sunset – 2013.** No Licensed Player that passes Decrypted AACs Content to analog video outputs may be manufactured or sold by Adopter after December 31, 2013.*

Analog sunset provisions apply only to AACs licensed players, which are products authorized to play back AACs-encrypted content. Currently, the only applicable products are Blu-ray Disc players, whether the player in question is a physical device or software run on a PC.

For standalone devices meant to play back commercial Blu-ray Discs, the analog sunset provisions are simple. Blu-ray Disc player models manufactured after 2010 may only have standard definition analog video outputs, and models manufactured after 2013 may not have any analog video output, when the content is protected by AACs.

For PCs, AACs analog sunset provisions only restrict video outputs during Blu-ray Disc playback. For example, a PC equipped with licensed Blu-ray Disc playback software, created after 2010, would have its VGA output restricted to standard definition when playing Blu-ray Discs, but the VGA output is free to display its maximum resolution when the PC is not playing Blu-ray Disc. Similarly, after 2013, the analog sunset will have no bearing on PC video outputs when Blu-ray Discs are not being played.

Similar to the analog sunset provisions for Blu-ray Disc players are the Digital Only Token, DOT, and the Image Constraint Token, ICT, embedded onto Blu-ray Discs. These are defined in Exhibit E, part 1, sections 2.23 and 2.26 of the AACs Adopter Agreement:

2.23 "Digital Only Token" shall mean the field, as described in the Specifications, used to trigger the limitation of output of Decrypted AACs Content to only-digital outputs.

2.26 "Image Constraint Token" shall mean the field, as described in the Specification, used to trigger a Constrained Image as set forth in these Compliance Rules.

Constrained image is defined in section 2.17 of the same part of the agreement as follows:

2.17 "Constrained Image" shall mean an image having the visual equivalent of no more than 520,000 pixels per frame (e.g., an image with resolution of 960 pixels by 540 pixels for a 16:9 aspect ratio).

As with the analog sunset, the AACs license agreement provides rules for the use of the DOT and ICT. These appear in Exhibit E, part 3, sections 1.2, 1.3, and 1.4, partially quoted below:

1.2.1 Content Participant/Provider may assert the Digital Only Token only with respect to (a) Non-Consumer Products and/or (b) LCP Units Released in a given country within the first six (6) weeks after the first Theatrical Release of substantially similar Digital Entertainment Content in such country, provided that in the event of the circumstances set forth in this part (b), within six (6) months after such first Theatrical Release, Content Participant/Provider shall Release in such country LCP Units containing a version of such Licensed Content Product that does not assert the Digital Only Token.

1.3.2 Content Participants/Providers shall not, prior to December 31, 2010, direct Licensed Content Producers to embed the Image Constraint Token in Licensed Content Products offered for sale or other distribution in a country in which there was a government or quasi-government regulation or equivalent prohibiting the use of an Image Constraint Token, or equivalent, for scrambled or encrypted content as of November 30, 2005.

1.4 Image Constraint Token and Digital Only Token Disclosure.

If Content Participant/Provider has directed that the Image Constraint Token and/or Digital Only Token be set with respect to a particular LCP Unit, then the fact that such Image Constraint Token and/or Digital Only Token (as applicable) is set shall be disclosed by the Content Participant/Provider to the consumer either (i) on such LCP Unit's product packaging; or (ii) only in the case of a consumer product, by other reasonable means that allows the consumer to be aware at the point of initial purchase that the Image Constraint Token and/or Digital Only Token (as applicable) is set with respect to such LCP Unit.

To summarize, the ICT can be deployed in Blu-ray Discs only after December 31, 2010. The DOT can only be deployed in Blu-ray Disc movie titles that are offered for sale within 6 weeks of the movie's initial theatrical release, and any Blu-ray Discs carrying these tokens must be labeled accordingly. A Blu-ray Disc with an active DOT would disable the analog outputs of the player, and a Blu-ray Disc with an active ICT would limit the resolution of analog playback to less than 520,000 pixels per frame.

What the Analog Sunset is Not

The analog sunset only governs equipment licensed for AACS-encrypted content playback, and has no authority to restrict the playback of non-Blu-ray Disc media such as unencrypted media files, presentations, or CDs. Other methods for media and content delivery utilizing a combination of software, hardware, and online services may or may not duplicate the licensing requirements or analog sunset features established by AACS for Blu-ray players. While not governed by AACS analog sunset requirements, online



The analog sunset does not apply to cable and satellite TV set-top boxes.

services such as Apple iTunes® that offer protected content for download or streaming, may require limitations on analog outputs. But this would depend on the policies of the particular service in question, and whatever agreements the service has with content owners such as the Motion Picture Association of America - MPAA.

The analog outputs of cable or satellite TV set-top boxes, including receivers or DVRs, are sometimes improperly associated with the analog sunset. In the United States, the FCC has a regulation, 47 CFR 76.1903, that **explicitly prohibits the disabling of analog outputs** on cable and satellite set-top boxes:

76.1903 Interfaces

A covered entity shall not attach or embed data or information with audiovisual content, or otherwise apply to, associate with, or allow such data to persist in or remain associated with such content, so as to prevent its output through any analog or digital output authorized or permitted under license, law or regulation governing such covered product.

In May 2010, the FCC granted approval of an MPAA petition to waive the rule quoted above, so that analog outputs may be selectively controlled by the program content. With this approval, set-top box analog outputs will only be disabled for newly created VOD, or video-on-demand services wherein first-run movies are made available before release on disc. This would function similarly to the DOT for Blu-ray Disc. Furthermore, the FCC only allows a maximum of 90 days of analog output control per movie title, or until release on disc, whichever is sooner. The MPAA “Selectable Output Control” will not affect analog outputs when set-top boxes are tuned to cable or satellite channels, since the petition only applies to VOD. The FCC granted this waiver on the basis that current programming services will not be disrupted for consumers.

Video Source Device	Content Displayed	Analog Outputs Status
Blu-ray Disc player	Commercially sold Blu-ray Disc	Standard definition only after 2010, disabled after 2013
PC	Commercially sold Blu-ray Disc	Standard definition only after 2010, disabled after 2013
PC	Protected content e.g. iTunes®	Depends on individual agreements between service provider and content owner
PC	Non-protected content	No requirements to disable
Satellite/Cable TV set-top box	Subscribed channels	May not be disabled in the United States
Satellite/Cable TV set-top box	Video-on-demand	In the US, only to be disabled for new services offering first-run movies for 90 days or before availability on disc

Table 1: Status of Analog Video Outputs

Summary

Video technology is quickly moving towards digital formats. But the analog sunset has a limited meaning when applied in a legal sense. The term refers to the AACS licensing restrictions placed on the analog video outputs of Blu-ray Disc players. Licensed Blu-ray Disc players produced after 2010 and playing protected content must limit analog video output to standard definition, and licensed Blu-ray Disc players produced after 2013 must not output analog signals when playing protected content. The analog sunset does not apply to computers when they are not playing Blu-ray Discs, and does not apply to video equipment not associated with AACS-encrypted Blu-ray Disc playback, such as cable TV receivers and DVRs.

Table 1 summarizes the impact of the analog sunset on video outputs. Only the first two entries, which involve Blu-ray Disc playback on dedicated players and PCs, are governed by analog sunset. Note that analog sunset provisions are minimum requirements, and unless prohibited by law, manufacturers may choose to restrict or eliminate analog video outputs on their products in advance of the AACS deadlines, if they feel this would be acceptable in the marketplace.

References

Advanced Access Content System ("AACS") Adopter Agreement, June 19, 2009

Title 47, Code of Federal Regulations, Part 76, Multichannel Video and Cable Television Service

Motion Picture Association of America, Petition for Expedited Special Relief: Petition for Waiver of 47 C.F.R. § 76.1903, May 9, 2008

FCC, DA-10-795, Granted in Part and Denied in Part MPAA's Petition for Waiver of Section 76.1903 of the Commission's Rules, May 7, 2010

Extron Electronics, headquartered in Anaheim, CA, is a leading manufacturer of professional AV system integration products. Extron products are used to integrate video and audio into presentation systems in a wide variety of locations, including classrooms and auditoriums in schools and colleges, corporate board rooms, houses of worship, command-and-control centers, sports stadiums, airports, broadcast studios, restaurants, malls, and museums.

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