To:	Eclipse Support Agreement & Warranty Customers
Date:	August 28, 2008
Subject:	BD Region Code Analysis - Informational

Eclipse TechFlash Bulletins are periodically used to provide support agreement & warranty customers with useful information about optical disc formats and technology. This bulletin written by Ed Younger discusses how region coding is implemented in the Blu-ray format and why it is challenging to analyze.

Summary:
Determining and reporting the region code settings on a Blu-ray title is not a simple task. The region code instructions are embedded deep into the content and cannot be determined without sophisticated analysis. To address this, the Region Coding of a disc can also be summarized in the BDCMF. Unfortunately, the region code information in the BDCMF is not always complete or accurate. EclipseSuite attempts to analyze, validate, and report the BDCMF and HDMV region code data. Region code analysis is not supported for BD+ and BD-J titles.
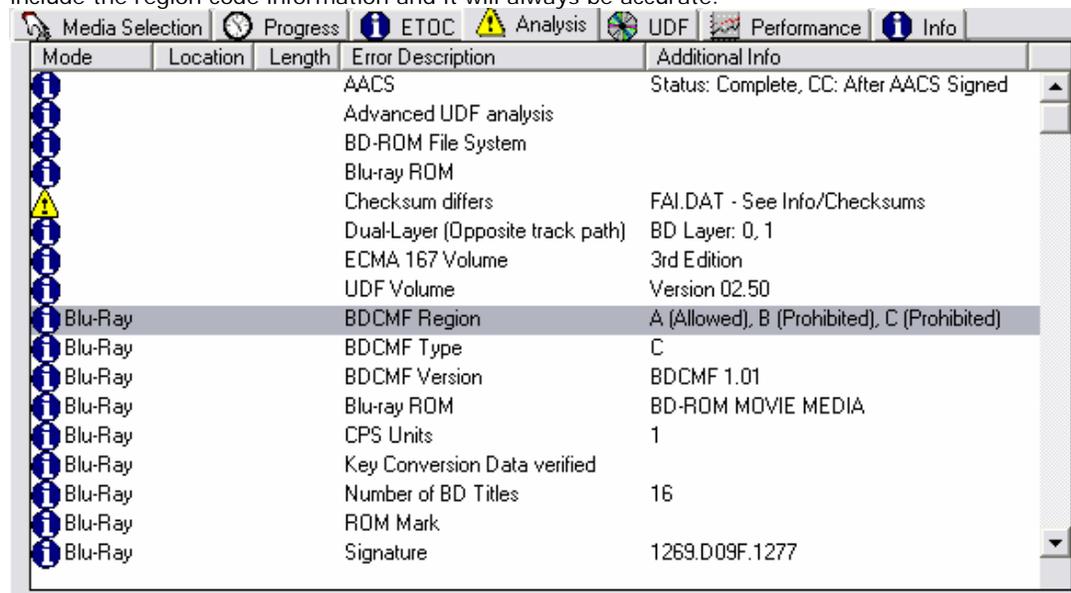
Background: The region coding method of Blu-ray is more sophisticated than the DVD implementation. With DVD, the entire disc was assigned a region code. All titles on a disc were assigned the same region code which could easily be read from the Control Data and Video Manager file. With Blu-ray, however, it is possible to set region codes for each individual title on the disc. The region code instructions are contained in the navigational playlists of the title. This region code implementation gives authors flexibility when determining how a disc will behave in players from each region. As a result, the EclipseSuite tools must parse through the navigational commands to determine in which regions each title is allowed to play.

Blu-ray region coding divides the world into regions A, B, and C. Each region can have one of the following attributes:
Allowed - The entire disc can be played back.
Limited - Only a part of the disc can be played back.
Prohibited - The entire disc can't be played back.
Not Applicable - The authoring studio cannot set Region.

BDCMF Images:
If completed by the authoring software, EclipseSuite will report the region codes found in the BDCMF image "Region Code" element by displaying it on the analysis tab of the EclipseSuite application. It is important to note that the region code flags in the BDCMF do not provide instructions to the encoder or encryption engine and do not directly control the region code instructions in the actual image. They are there for reference only and therefore do not provide a definitive depiction of the actual region coding on the disc. Ideally, the BDCMF image will always include the region code information and it will always be accurate.

Figure 1: Region Code from BDCMF Displayed on Analysis Tab

Blu-ray movies are authored using one of two authoring formats. HDMV Content is the basic method of authoring titles . BD-Java is a more advanced authoring style that can take full advantage of the BD-Java programming layer.

HDMV Content:

When analyzing replicas and BDCMF images, EclipseSuite will parse the HDMV content to determine the region code data. This information will be displayed on the Video Attributes page in the Info tab. Each region will list the clips and titles assigned to that region code. In the screenshot below, you can see the Title 3 (Clip 00004.m2ts) will be displayed in Region B and C players. Region A players will be allowed to play all other Titles and the Top Menu. This will be the typical structure for a title that has region restrictions.

Figure 2: Region Code extracted from HDMV Playlist displayed on Info: Video Attribute Tab

BD-Java Content:

Region coding can also be managed through the BD-J programming language. At this time, EclipseSuite cannot determine the region code of BD-J titles. For BD+ images, it is likely that the BD+ security layer will prevent an accurate determination of the region code.