

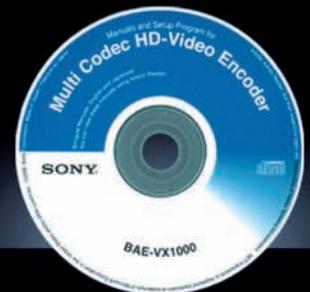
SONY®



## Sony Blu-code™ Encoder (BAE-VX1000)

A High-Quality, High-Speed H.264/AVC and MPEG-2  
Encoding Solution for Blu-ray Disc Authoring

Real-time software encoding on a single workstation platform with superb picture quality, fully customizable settings, and time-saving tools that help HD content providers realize the full potential of the Blu-ray Disc™ revolution. Trust Sony to bring you the best in High Definition. It's in our DNA.



# Get in the Game—with Blu-code Encoder!

## Sony Blu-code (BAE-VX1000) Multi Codec HD Video Encoder

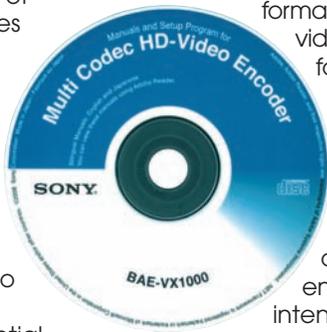
The era of Blu-ray Disc™ has opened up a world of opportunity for HD content providers, and Sony led the way with the pioneering BAE-VM770 and BAE-VA700 Encoders. With the new Blu-code Encoder (BAE-VX1000), Sony now combines the capabilities of previous Encoders into one high-speed Blu-ray software encoding system. High-quality and high-speed H.264/AVC and MPEG-2 encoding is now within reach of all HD content providers, including independent production companies and broadcasters.

### Powerful Features:

The Blu-code Encoder is a strictly compliant Blu-ray Encoder that supports the features and parameters of the BD specification. All profiles and levels of H.264/AVC and MPEG-2 compression are supported; carefully designed presets remove the complexity of encoding, resulting in superb picture quality with minimal user intervention. Its multi-threaded design allows you to capture and encode simultaneously, saving substantial time and resources.

### Strict Blu-ray Compliance

The Blu-ray Disc specification is strict and complex, and the Blu-code Encoder produces encoded streams that fully adhere to this criteria. In addition, full access to all MPEG-2 and H.264/AVC Codec parameters are permitted within the specification without any risk of encoding files out of compliance. The user is protected from selecting invalid parameters, guaranteeing that all encoded files will pass verification.



### Supports both H.264/AVC and MPEG-2

Create H.264/AVC or MPEG-2 High Definition video streams that are compatible with BD-ROM and BD-R/RE formats. MPEG-2 Standard Definition video streams for the DVD video format can also be created.

### Advanced CABAC algorithm

The Blu-code Encoder uses the more advanced CABAC (Content Adaptive Binary Arithmetic Coding) algorithm for H.264/AVC encoding. This computationally intensive encoding provides exceptional compression performance.

### Supports all Blu-ray Video Formats

The Blu-code Encoder supports all standard Blu-ray Disc 1080 and 720 video system line rates and frequencies, as well as SD and HD secondary video streams.

### 3 Modes of H.264/AVC Encoding

The Blu-code Encoder provides 3 real-time H.264/AVC encoding quality modes that are optimized to run on a scalable system configuration, ranging from a single

workstation to a license-free distributed processing system:

- Express Mode: Real-time H.264/AVC encoding with a single workstation.
- Speed Mode: Real-time H.264/AVC encoding with a distributed encoding system (3 encoding PCs), to balance picture quality and encoding time.
- Quality Mode: Real-time H.264/AVC encoding with a distributed encoding system (4 encoding PCs) for the highest picture quality.

### High-Speed MPEG-2 Encoding

The Blu-code Encoder provides 2 faster-than-real-time MPEG-2 encoding quality modes on a single workstation. Performance speeds can be further improved with a license-free distributed processing system:

- Speed Mode: .6x faster than real time with a single workstation.
- Quality Mode: .7x faster than real time with a single workstation.

### Slide Show Encoder

Encode both Time-based (synchronous audio) and Browsable (asynchronous audio) slide shows from BMP, TIFF, PNG, JPEG files with the Blu-code Encoder.

### Multi-Angle Encoding

Exact I-frame/IDR-frame insertion is used by the Blu-code Encoder to minimize angle change delay during playback. Choose from Single Angle, Seamless Change Multi-angle, and Non-Seamless Change Multi-angle.

### Buffer Optimization

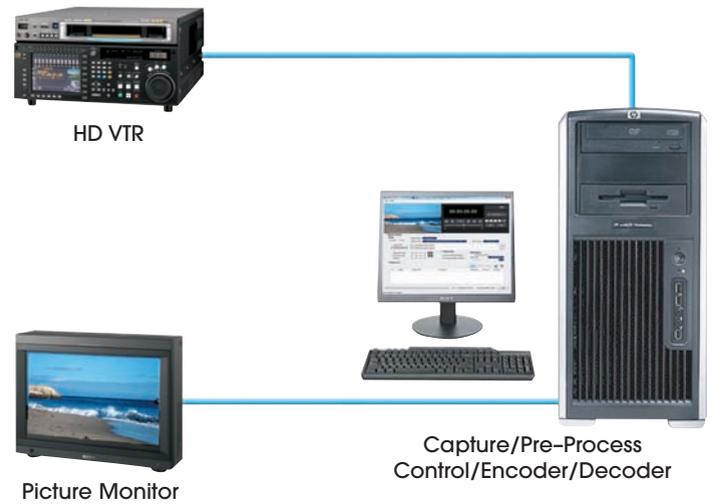
Encoded streams are fully optimized by the Blu-code Encoder for the Hypothetical Reference Decode (HRD in the BD specification) to properly maintain buffer management in BD players.



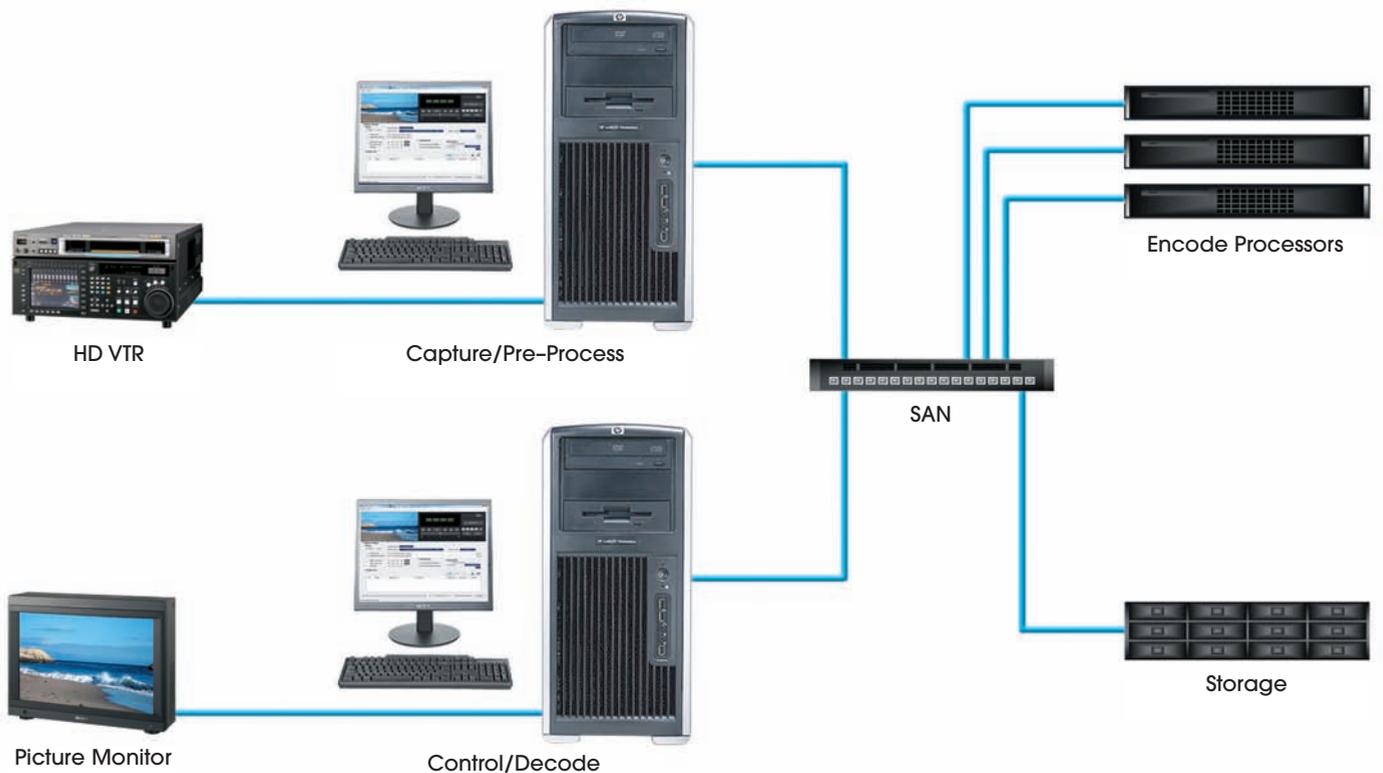
## Simple connectivity in multiple configurations

The Blu-code Encoder is an ideal solution for a wide range of Blu-ray Disc applications. In cost-effective single-workstation configuration, it gives you simple control and allows you to capture, preprocess and preview content and review elementary data streams. In high-performance distributed encoding configuration, it supports unlimited nodes in a license-free processing system that can be expanded with your needs.

Cost effective single workstation configuration.\*



High performance distributed encoding configuration. Unlimited nodes supported at no cost.\*



\*The components in these systems are sold separately.



### Closed Captioning

BD-ROM compliant Closed Captioning files can be inserted into the encoded video stream of the Blu-code Encoder.

### XML Architecture

The Blu-code Encoder provides management of batch capture and batch encoding lists, project data, and the import and export encode parameters via XML file structure. In addition, chapter mark insertion based on timecode values is supported with popular authoring application through an XML Schema.

### Superb Picture Quality

The sophisticated encoding algorithm of the Blu-code Encoder makes it easy to obtain superb picture quality. Use the system defaults for exceptional results, or fine-tune encoding parameters to the individual content.

### Automatic Encoding Pre-sets

With the Blu-code Encoders pre-set encoding parameters based on the source file content, simply select from the source content categories and the system calculates the proper settings:

- Genre:
- Film
  - CG Anime
  - Sports
- Texture:
- Film grain/camera noise

### Preset Scaling List

For H.264/AVC encoding, you can select from 7 preset scaling lists. Choose from Flat (default setting), Dither Noise reduction, Vertical or Horizontal Dither Noise reduction, and Progressive or Interlaced Grain Preservation. In addition, up to 20 new scaling lists can also be defined by the user and imported and exported from one system to another.

### Auto Customize Function

To shorten encoding time, the Blu-code Encoder can automatically detect regions within a file that are difficult to encode, and then perform up to 5 encodes using user-defined bit rates. When 2-pass encoding of the entire file is complete, the multiple versions can be reviewed and the most suitable one based on its picture quality and file size can be selected.

### Auto Deblocking Filter

During H.264/AVC encoding, a deblocking filter can automatically be set with the appropriate value to any region where it is necessary. The offset value of a deblocking filter can also be set manually by adjusting alpha and beta coefficients independently.

### Frame by Frame Customization

The value of each encoding parameter can be adjusted frame by frame to provide the best picture quality with 2-pass VBR encoding. Using a customize/review window, check the picture quality with H.264/AVC and MPEG-2 decoder, and change the value of each parameter with mouse or keyboard operation. Customized areas are designated by color on the GUI.

### Segment Encoding

After customization, re-encoding can be done to a selected range. The optimum picture quality can be obtained in the shortest time because re-encoding of the entire title is not required.

### Scene Change Detection

Automatic or manual detection of scene changes for encoding optimization can be affected by the Blu-code Encoder. In manual mode, scene change locations can be identified by timecode so that GOP structure can begin at division points.

## Workflow Efficiency

The Blu-code Encoder can reduce the total working time of an encoding series up to 30% compared with Sony's previous encoders. The following features all contribute to simple functionality, improve workflow and significantly reduced encoding time.

### Capture and Pre-process Simultaneously

The Blu-code Encoder has a capture utility that can capture 8 or 10 bit YUV 4:2:2 uncompressed AVI files and up to 8 channels of uncompressed WAV audio files via HD-SDI. Pre-processing of scene changes and 2-3 pull-down pattern detection are executed during capture. On a distributed rendering system, slices are automatically assigned to each render node, and encoding can begin immediately after capture without further pre-processing.



### Pull-down Detection

Auto-detection of 2-3 pull down patterns of incoming video can be set by pattern difficulty (Weak, Normal, Hard), with threshold adjustment for each. Pull-down patterns can also be manually assigned and broken patterns corrected. Existing patterns can be imported and six existing patterns can be edited.

### Batch Processing

Encode multiple projects in a batch list for overnight processing. In addition, during Roll Encode mode, separate captured media files can be concatenated into one finished file after encoding. Along with encoding, the capture and pre-process functions can also be set as a batch process.



### Stream Replacement

After encoding, replace a selected region of the encoded stream with a re-encoded file. This greatly reduces the amount of re-encoding required for difficult-to-encode scenes.

### Fast 2-pass VBR Encoding

In Fast 2-pass VBR mode, the Blu-code Encoder doesn't encode during the first pass; rather, it calculates the bit assign using Sony's unique measuring algorithm. This reduces the necessary first-pass time in half compared to normal 2-pass VBR.

### Multi-threaded Application

Designed as multi-threaded application, the Blu-code Encoder allows multiple functions to be performed simultaneously in a distributed system using independent PCs. For example, one file can be captured while another file is being preprocessed or encoded.

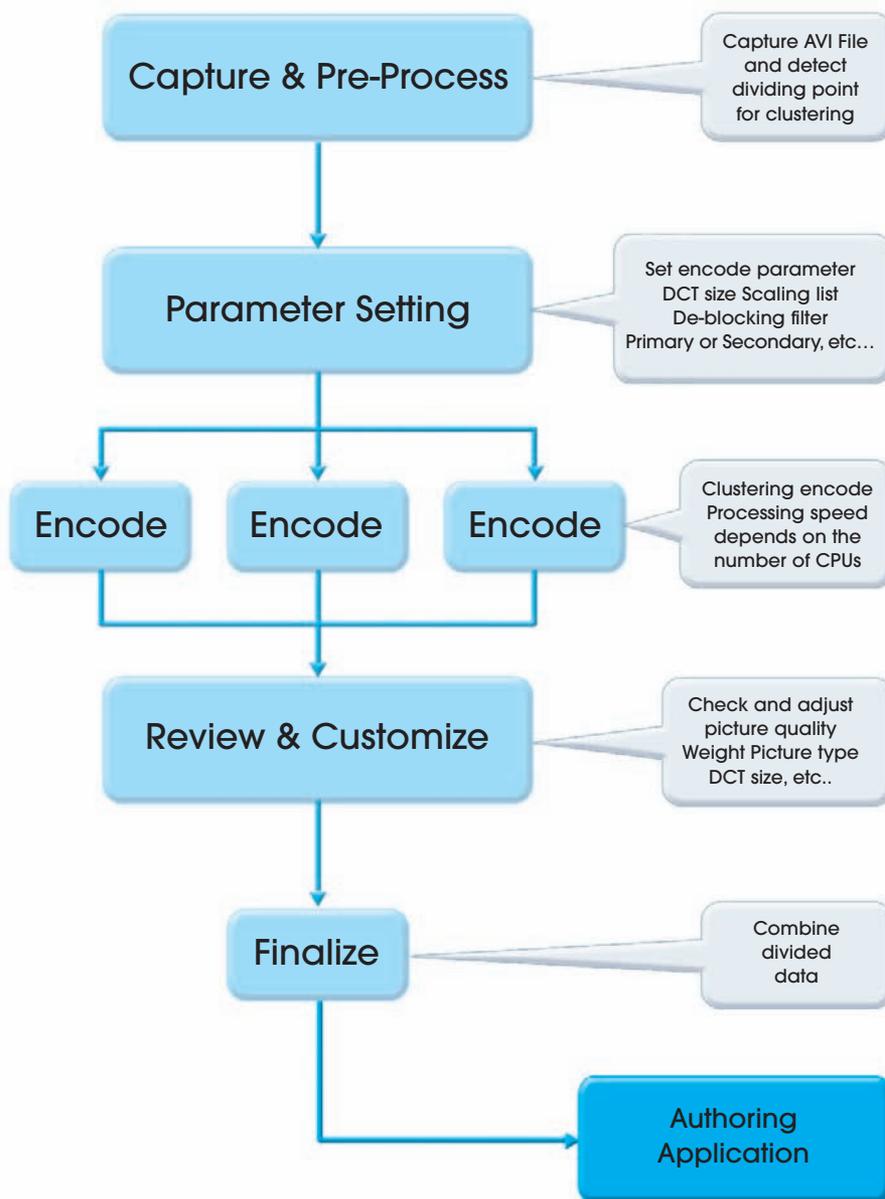
### Distributed Processing

For greater processing performance, the Blu-code Encoder offers the ability to scale the system configuration to include additional encoding processors. Unlimited render nodes can be attached through a SAN with no additional software licenses required.

### Real Time Decoder

The Blu-code Encoder can decode H.264/AVC and MPEG-2 elementary streams. This eliminates the need to multiplex and create a BD-R/RE disc, or convert to decodable file format such as AVI. The decoder provides simple VTR-like operation, and can also decode divided H.264/AVC and MPEG-2 streams without finalization to minimize the required storage size. In addition, quality checking is simplified with the ability to switch between decoded playback of encoded stream and uncompressed source file.

## Encoding Process



# Blu-code Encoder (BAE-VX1000) Specifications

## In/Out Video<sup>1</sup>

| Resolution  | Frame Rate                               | Aspect       |
|---|--|--------------|
| <b>HD:</b> 1920 x 1080, 1440 x 1080,<br>1280 x 720  | 23.976p. 24p. 25p<br>50i. 59.94i. 59.94p | 16:9         |
| <b>SD:</b> 720 x 480, 720 x 576,<br>704 x 480, 704 x 576<br>352 x 480, 352 x 576,<br>352 x 288, 352 x 240 | 23.976p. 24p. 25p<br>50i. 59.94i. 59.94p | 16:9,<br>4:3 |

## Capture

|                           |  |
|---------------------------|--|
| <b>Video Input:</b>       | HD-SDI HDMI™ <sup>2</sup>                      |
| <b>Audio Input:</b>       | HD-SDI HDMI <sup>2</sup>                       |
| <b>Video Control:</b>     | RS-422 Sony 9-pin remote, i.LINK® <sup>2</sup> |
| <b>Output Video File:</b> | AVI non-compressed YUV 4:2:2 10/8-bit          |
| <b>Output Audio File:</b> | AVI 48 kHz 16/10/24-bit                        |

## Pre-Process Part

|                    |   |
|--------------------|---|
| <b>Input File:</b> | AVI/QuickTime MOV®<br>(non-compressed YUV 4:2:2 10/8-bit) |
|--------------------|---|

## Encode Part

|                              |  |
|------------------------------|--|
| <b>Video:</b>                |  |
| <b>Input File:</b>           | AVI/QuickTime MOV<br>(non-compressed YUV 4:2:2 10/8-bit)   |
| <b>AVC Output File:</b>      | H.264/AVC Elementary Stream<br>conforming to BD-ROM Part 3 v2.2,<br>BD-RE Part 3 v3.0 Format                                   |
| <b>AVC Profile/Level:</b>    | High profile, Main Profile 4.1/4/3.2/3.1/3   |
| <b>MPEG-2 Output File:</b>   | MPEG-2 Elementary Stream<br>conforming to BD-ROM Part 3 v2.2,<br>BD-RE part 3 v3.0 Format, DVD-ROM<br>Part 3 v1.1 <sup>3</sup> |
| <b>Max. Transfer Rate:</b>   | BD 40 Mbps   |
| <b>MPEG-2 Profile/Level:</b> | MP@HL, MP@ML, MP@14L   |
| <b>Encoding Style:</b>       | 1 Pass CBR, 1 Pass VBR, Fast 2 Pass VBR,<br>2 Pass VBR   |

## Encoding Mode/Encoding Time<sup>4</sup>

|                |   |
|----------------|---|
| <b>AVC:</b>    | Express (real time), Fast (3X real time),<br>Quality (5X real time) |
| <b>MPEG-2:</b> | Fast (0.6X real time),<br>Quality (0.7X real time)                  |

## Still

|                            |   |
|----------------------------|---|
| <b>Input File:</b>         | BMP/TIFF/JPEG/PNG   |
| <b>Output File:</b>        | H.264/AVC Elementary Stream<br>conforming to BD-ROM Part 3 v2.2,<br>BD-RE Part 3 v3.0   |
| <b>Profile/Level:</b>      | High profile, Main Profile 4.1/4/3.2/3.1/3  |
| <b>Max. Transfer Rate:</b> | BD 40 Mbps MPEG-2 Elementary<br>Stream conforming to BD-ROM<br>Part 3 v2.2, BD-RE Part 3 v3.0,<br>DVD-ROM Part 3v1.1 <sup>3</sup> |
| <b>Profile/Level:</b>      | MP@HL, MP@ML, MP@14L  |

## Decode Part

|                            |  |
|----------------------------|--|
| <b>Input File:</b>         | AVC/MPEG-2 elementary stream<br>encoded by BAE-VX1000  |
| <b>Playback Functions:</b> | Play forward/backward, Pause<br>Play Fast forward/backward (2x)<br>Slow forward/backward (0.1 – 1.0x)<br>Step forward/backward, Jump to<br>next/previous chapter |

<sup>1</sup> Only supports the combination of video resolution and frame rate which is compliant to the BD-ROM Part 3 v2.2, BD-RE Part3 v3.0, DVD-Video Part 3 v1.1.

<sup>2</sup> Only supports Sony Handycam® camcorders which have been tested.

<sup>3</sup> Will not support MP@SL which is provided in DVD Video Part 3 v1.1.

<sup>4</sup> Encoding time is optimum when using recommended single workstation.

## System Requirements: Workstation

|                                     |  |
|-------------------------------------|--|
| <b>Recommended Workstation:</b>     | HP xw8600  |
| <b>Operating System:</b>            | Windows® XP® Professional x64 Edition<br>Windows Vista® Business x64 Edition<br>Windows Server 2003, Standard x64 Edition <sup>1</sup> |
| <b>CPU:</b>                         | Intel Quad Core Xeon® 3.2 GHz or higher <sup>2</sup>   |
| <b>Memory:</b>                      | 8 GB or higher   |
| <b>Graphics:</b>                    | Support PCI-Express x 16   |
| <b>HD-SDI I/O card:<sup>3</sup></b> | Blackmagic Design Decklink HD Pro 4:4:4 PCIe™/<br>Decklink HD Extreme <sup>4</sup>   |
| <b>HDMI I/O card:<sup>3</sup></b>   | Blackmagic Design Intensity™ <sup>4</sup>  |
| <b>Storage for Data Volume:</b>     | SAT All/III internal HDD x 5 units or more, RAID0  |
| <b>USB Port:</b>                    | For Hardware Key   |
| <b>Others:</b>                      | RS-422 port for VTR control<br>i.LINK port for Handycam camcorder control  |

<sup>1</sup> Windows Server 2003 is for encoding made in a distribution encoding system (not for use with a single workstation)

<sup>2</sup> AMD CPU is not recommended; this application is optimized for Intel CPU.

<sup>3</sup> These two cards cannot be installed in one PC at the same time.

<sup>4</sup> These two are the only I/O cards supported as of September 2008.

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