

ADV202 Alberio User's Guide

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1 ADV202 ALBERIO

Alberio application software is used to demonstrate JPEG2000 still image/video compression with the ADV202. It contains prototype software which demonstrates streaming JPEG2000 in a Windows Media environment. Certain functions are available without the requirement of having an ADV202 evaluation board installed.

Features

- ADV202 Still Image Demo
- ADV202 Network Broadcast
- ADV202 Network Player
- ADV202 HD Demo
- Utilities
 - DumpFileChecker
 - HIPI Source Creator

- Interoperability of the ADV202 and 3rd party software codecs, e.g. Kakadu.
- Alberio in conjunction with the ADV202 evaluation board can be used to demonstrate the ADV202 as a hardware accelerator for Windows Media architecture.

Applications

Alberio can be used to demonstrate the following functions:

- JPEG2000 still image compression of any .bmp file up to a resolution of 1024x768.
- An onscreen side-by-side comparison of JPEG2000 and JPEG still image compression.
- Networking JPEG2000 video/audio.
Real-time transmission of a JPEG2000 stream or a combined JPEG2000 video/audio stream over a network connection.
- Capture and compress to JPEG2000 standard, playback of a JPEG2000 compressed stream to PC screen, monitor or from file for NTSC, PAL, 1080i formats..
- The source code, distributed with Alberio, provides a reference framework in order to develop custom specific MS Windows streaming framework applications using the ADV202.

Functional Description

The following functions are provided with Alberio Software:

- **JPEG2000 Still Image Demo**

Requirements:

- Kakadu Version 4.2.1 or higher, must be installed on the PC. The software binaries can be downloaded from:

<http://www.kakadusoftware.com>

Win32 Executables must be installed. To do this go to : <http://www.kakadusoftware.com> and go to <Downloads>. Save the win32_executables.zip to you local hard drive and unzip to the C:\kdu folder. Alberio software expects these libraries in that folder.

Kakadu is a JPEG2000 software framework. For licensing agreements, about what part of this framework is available without licensing, please visit the kakadu website for more information.

Functions

- JPEG2000 still image compression using any .bmp source file up to a resolution of 1024x768.
- Side by side onscreen comparison of JPEG2000 and JPEG compression using any .bmp file up to a resolution of 1024x768.
- Demonstrate the scalability of JPEG2000.
- **ADV202 Network Broadcaster**

Functions (with ADV202 board being installed):

- Real-time capture over a network connection.
- **ADV202 Network Player**

Functions (without ADV202 board being installed):

- Playback of JPEG2000 file to PC screen.
- Playback of JPEG2000 video stream from network to PC screen.

Functions (with ADV202 board being installed):

- Capture Standard Definition [ITU.R.BT656] to file.
- Playback JPEG2000 compressed video from file, to PC screen or TV monitor.

- **ADV202 HD Demo**

Functions:

- Capture to file of 1080i or 720p uncompressed sources.
- Display of compression ratio, data throughput during encode or decode.
- Access to parameter settings in encode mode.
- HD Pass Through [requires 2 ADV202-HD boards].

Installation

- **ADV202 Toolkit [Sirius] uninstall**

If the ADV202 Evaluation Kit / ADV202 Toolkit (Active) [or Sirius] has been previously installed on the PC, the driver for this software must be uninstalled prior to installing Alberio.

To do this, please right click on the <My computer> icon in the desktop window, choose <Properties> from the drop-down menu, go to the <Hardware> and select <Device Manager>.

Select <ADV202 Evaluation board EVB-I> and select <Uninstall> from the menu. Please make sure that the driver has been deleted from the

C:\windows\system32\drivers directory.

If the <ADV202SR.sys> file is still present, please delete it manually.

- **Compuware Driver Studio**

In order to use the driver source code, Compuware Driver Studio must be installed before installing Alberio.

Select all the source modules in the custom installation. If the

setup does not detect a valid Driver Studio license it will not install the Driver Studio related source code.

Driver studio is available at:

<http://www.compuware.com/products/driverstudio/default.htmr>.

- **Source code environment**

Please read the source code notes for the information and links regarding what SDKs and environment variables must be set up in order to build the source code projects. It is located in the root directory of the Alberio folder.

Note: Kdu42R.dll, which is necessary to run the software decoder code, can only be obtained in contacting Kakadu. The Alberio project contains the wrapper for the Kakadu dll. In order to obtain the source code for the wrapper, the license for the Kakadu source code must be obtained. Please refer to the Kakadu website at <http://www.kakadusoftware.com> for licensing agreements.

- **Prerequisites**

MS DirectX 9.0b [or higher] runtime should be installed on the target machine.

If DirectX 9.0b [or higher] runtime (or DXSDK) is not installed on the PC, or to check if it is installed, please run dxsetup.exe from the “.\DirectX9 “ directory. After the DirectX setup window pops up, please follow the on-screen instructions.

Note: If a reboot is requested after this step, do not proceed to the next step until the reboot is completed.

- Please ensure that the latest video drivers are installed on your card. Old video drivers can cause playback of the video to be unstable and freeze occasionally.
In order use the <JPEG2000 over network> application, it must be ensured that the correct audio drivers are installed and enabled.
- Please ensure that latest Windows Media are installed [version 10 at the time of writing] and the latest DirectX updates.
- It is recommended to install the Alberio software first, and then install the ADV202 evaluation board so that Windows detects it. If the board is installed first, Windows will ask for the driver for the board which is not installed yet.

- **ADV202 Alberio Installation**

Run setup.exe from the root directory and follow the on-screen instructions. A reboot is required. After the reboot, Windows will find the new hardware automatically and may propose to select a driver from two options:

- ADV202 Evaluation board EVB-I
- Multifunctional JPEG2000 device

Please select <Multi-functional JPEG2000 device>.

- **Alberio driver manual installation**

In some instances [for example, if the ADV202 Evaluation Kit or Sirius version of the application software has been previously installed on the PC], it is possible that the setup.exe will not install the Alberio driver completely. In this case a manual instal-

lation is necessary.

To manually install the Alberio driver:

- Right click on <My computer> in the desktop window and select <Manage>.
- Select the <Device Manager> and from the list of devices, double click on the <ADV202 Multifunctional JPEG2000 device>. If the ADV202 Multifunctional JPEG2000 is not listed, go to the <Control Panel> and select <Add hardware>.
- Select <Install from a specific location>, select <Don't search, I will choose the driver to install>, select <ADV202 Multifunctional JPEG2000 device> and select <next>.
- Select <Continue Anyway>, if you agree with the windows message from the pop-up menu and finish the installation.

2 ADV202 NETWORK BROADCASTER

The <ADV202 Network Broadcaster> can be used to demonstrate transmission of JPEG2000 compressed video or combined video/audio stream over a network connection.

In order to demonstrate this feature two PCs are required, with at least one of them having the ADV202 evaluation board installed, both system must have Alberio installed.

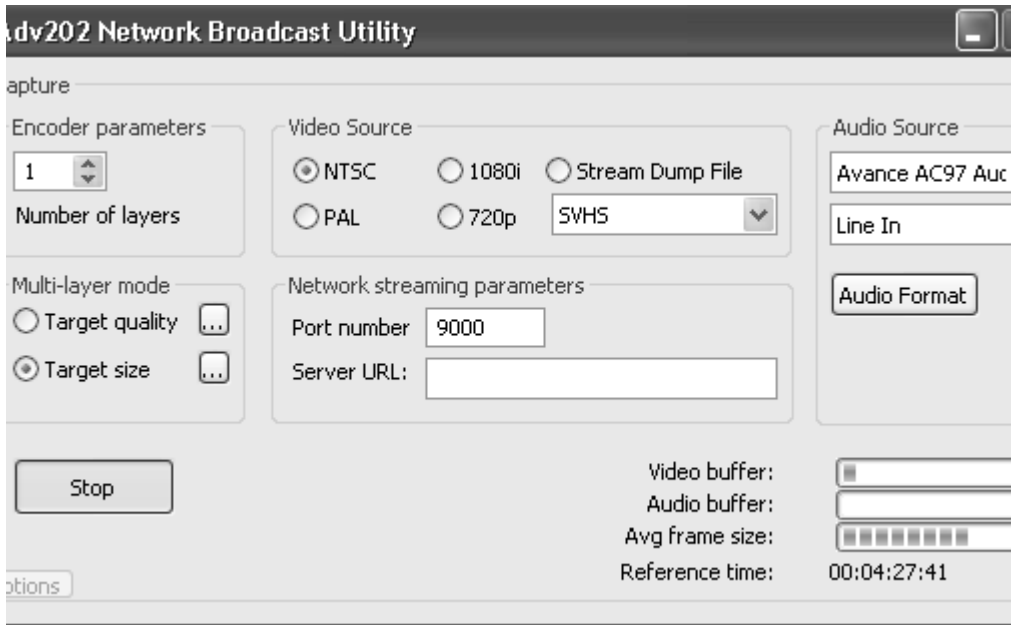
Send JPEG2000 stream over a network connection

- Connect NTSC video source to the PC that has the ADV202 evaluation board installed and which should serve as the broadcast device.
- From the programs menu select <ADV202 Network Broadcaster>.
- For the first broadcast, it is recommended to use the settings as shown in below figure. Select <Run> to start broadcasting.

- After a few seconds the <Internal Buffer> progress bar reaches maximum and goes back to zero [or close to zero]. At the same time <Avg frame size> should stabilize at a certain level. It means that the broadcaster is running, taking data from the AVstream capture filter and broadcasting it to the network [see figure below].
- Enable the receiving PC in order to play back the video. In order to do this, run the <ADV202 Network Player> from the program menu.
- Select <Open URL> from the <File/Open> menu. Specify the URL in the form :
http://<broadcaster_IP_address>:port>,
The <broadcaster_IP_address> must be the IP address of the transmitting device.

For example: http://10.10.100.100:9000

Within a few seconds the video on the receiving PC should be visible.



i The Microsoft network ASF reader filter, which is used in the player, has a **minimum** latency of 5 seconds, depending on the network conditions this can extend to several minutes.

i **Number of layers.**
The JPEG2000 video stream can be programmed to have several layers [Encode parameters, Number of Layers]. The ADV202 network broadcaster creates a stream with sub-streams [one sub-stream per one quality or size layer]. Sub-streams are broadcasted to subsequent consecutive ports starting from the port chosen in the <Port Number> field.
To play back a specific layer on the receiving PC, the URL address must call up the specific layer in indicating the port

address.

For example:

Number of layers selected: 3

To playback the 2nd layer, use IP address with port number 9001, for example:

`http://10.10.100.100:9001`



The Network Player does not support hardware codec [ADV202] for playback of the stream with resolution lower than the original. Quality layers playback with using the ADV202 is supported in full. This is not a hardware limitation, but a limitation of the current set of streams supported by the software filters.



Network with Media Server.

With Windows 2003 Server, it is possible to add Media Server role to the server, create publishing points with sources from different sub-streams of the ADV202 network broadcaster[s] and use `mms://` protocol to specify the network player URL (e.g. `mms://my_media_server/medium_throughput_layer`). Advantages of using mms is improved robustness over http. http is suitable for LAN, but for broadcasting over the internet it is highly recommended to use MS Media Server.

3 ADV202 NETWORK PLAYER

This section describes the functionality of the <ADV202 Network Player>.The <ADV202 Network Player> can be used in a stand-alone application, i.e. in a non-network application or in a <video over network playback> application.

Playback JPEG2000 demo file **[No ADV202 evaluation board installed]**

From the program menu select <ADV202 Network Player>.

- File/ Open
 - Load the <J2Kdemo.asf> file from the Program Files/Analog Devices/Alberio/Video/ folder
 - Select the <Play> icon to play the demo to PC screen.

Capture/playback JPEG2000 video [ADV202 evaluation board installed]

From the program menu select <ADV202 Network Player>.

- <File/ Open>
 - Select <Live Video Capture>.
If this option is not available, the Alberio driver has not been installed completely. Please refer to the <Installation> section of this document for instructions on how to manually install the driver.
 - From the <ADV202 Options> pop-up menu, select <SVHS> for S-video input and output, enable the correct standard [NTSC by default].
 - Compression rate is selected with the <Starting Rate Control> value.
This control sets the field size in KBytes.

NTSC uncompressed field size is approx. 345KBytes or 20MBytes/sec.

The compression ratio, compressed field size and compressed data rate are indicated at the bottom of the screen and can be changed on the fly with the scroll control at the bottom of the screen.

- To display the compressed video to PC screen, select <play to screen> from the Tools menu.
- To display the compressed video to a monitor, select <play to ADV202> from the Tools menu. The S-video output must be connected to a TV monitor.
- Use the play and stop icons to start and stop capturing.

- With <De-interlace> function from the Options menu enabled, the ADV202 de-interlaces incoming odd and even fields into one frame and then compresses the frame. This significantly improves compression efficiency, i.e when de-interlace is enabled, the compression rate can be increased in order to achieve same picture quality as with de-interlaced disabled.
The de-interlaced video stream can only be played back on the PC screen.



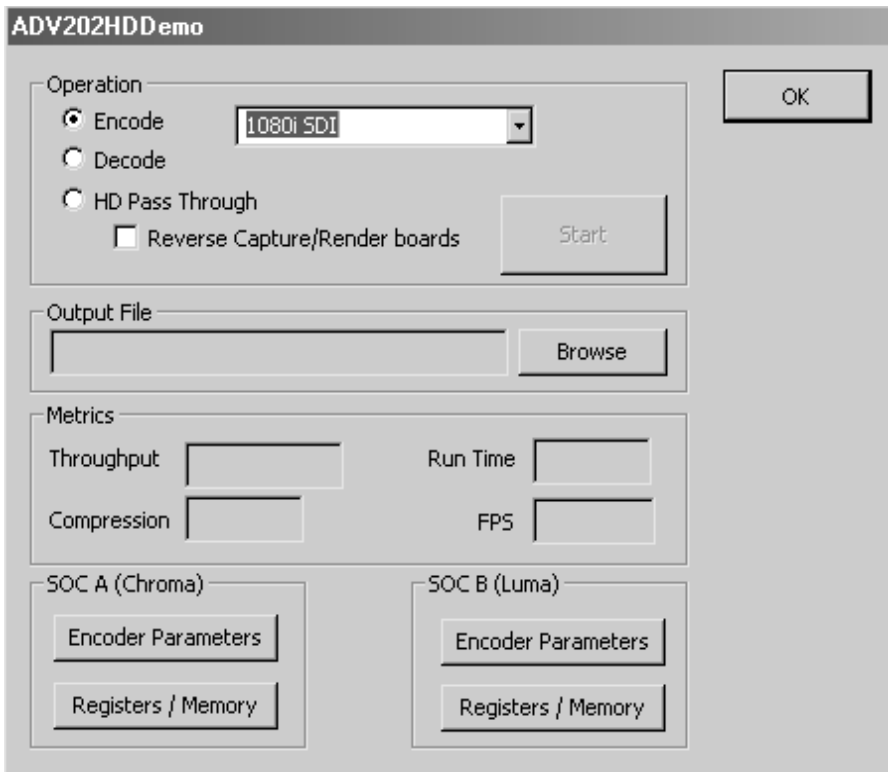
Latency

<Live Video Capture> demonstrates extremely low latency using the ADV202 for JPEG2000 compression. The incoming video is sent directly from a video decoder to an encoding ADV202 for JPEG2000 compression. The compressed stream is sent to a second ADV202 for decompression. The decompressed video can be either played back to a monitor or to the MS Windows DirectX renderer for display on the PC screen.

4 ADV202 HD DEMO

This section describes how to use the ADV202 HD Demo functionality distributed with the Alberio software.

ADV202 HD DEMO



To encode to file:

- Select <Encode> and the HD format from the scroll menu.
- Select the <Encoder Parameter> tab for encode parameter settings.
Encode parameters are explained in more detail in the <Getting started with the ADV202> application note.

Pixel IF configuration settings are described in the
<ADV202 User's Manual.pdf>

 It is recommended to use a Chroma target size factor of 6-10 less than Luma target size to achieve optimum quality.
For example if Luma is set to a Target Size of 30 000, Chroma should be set to a Target Size of 3 000.

- Select <Browse> and choose location and filename for the captured file.
- Select <Start> to start capturing.

 If there is no source connected to the board, the mouse will get very unresponsive until <Stop> is selected again.

To decode from file:

- Select <Decode>.
- Select <Browse> and open the file to be played back.
- Select <Start> to begin playback.

Encoder Parameters

720p60p Chrominance
8-bit
5 Transform Levels
Uni C, Uni Y
64x32
9/7 Irrev
No Attributes Out
CPR
Quantization
0
Stall Parameter
0
Step Sizes
3 [0x3]
63456 [0xF7E0]
18 [0x12]
150C [0x5DC]
☐ Load SS

Code Stream Format
12C
☐ Suppress ADI Header
☐ Use PPT ☐ Use EP4
☐ Use PLT ☐ Use SCP
Rate Control
Target Size
65535
8192 [0x2000]
16384 [0x4000]
24576 [0x6000]
32768 [0x8000]
40960 [0xA000]
Pixel IF Config
☐ Use HVF
☐ Field Polarity Positive
☐ HSync Polarity Positive
☐ VSync Polarity Positive
☐ VCLK Polarity Positive

Visual Weighting
No Weighting

Y Visual Weighting
320
321
322
323
324

Cr Visual Weighting
89E
897
89E
895
90C

Cb Visual Weighting
608
609
610
611
612

OK

Cancel

5 ADV202 STILL IMAGE DEMO

JPEG2000/JPEG side by side comparison

- From the Program Menu, select <ADV202 Still Image Demo>
- Select <Browse> to load a .bmp file. Maximum resolution 1024x768.
- <Source Image> displays the uncompressed bitmap resolution, file size and bits per Pixel
- To compress a .bmp file to JPEG2000 and JPEG, input the desired compressed file size in KBytes in the <Desired File Size> window and select <Compress> .

Compressed file size and compression ratio are displayed at the bottom of each image.

JPEG2000 scalability

JPEG2000 encodes data into a single stream containing several different layers and wavelet transform levels.

Low numbered transform levels [resolutions] will display the picture contents with low frequency content. Each increase in transform level [resolution] will add

picture information containing high frequency information.

Layers or quality layers refer to different compression rates. Low numbered layers display the image using highest compression rates. High numbered layers display the image using least amount of compression.

It is possible to display up to 5 wavelet transform levels and up to 6 quality layers individually with the <ADV202 Still Image Demo>.

The JPEG2000 viewer will display each quality layer contained in the JPEG2000 stream as they are selected with the <Layer> slider function.

The JPEG viewer will display the equivalent sized image. In order to display the equivalent JPEG image, the compressed JPEG image must first be decompressed and then compressed to the new selected size.

This decompression/recompression process is not necessary with the JPEG2000 encoded image since all this information is contained within the JPEG2000 stream.

Demonstrate JPEG2000 scalability

- Load a .bmp file into the <ADV202 Still Image Demo>. Leave <Resolution> and <Layer> at their maximum settings and choose a <Desired File Size> which will result in an approximate 10 :1 compression ratio. For example, for a <Base Image Size> of 450 KB, choose <Desired File Size> of 36 KB. Then select <Compress>.
- With the slider control select <Layers> to 4 layers. In order to display the image with the new selected size, the JPEG image has to be first decompressed from the first compression

and re-compressed to its new size.

The JPEG2000 image will not have to go through this process, since all this information is contained within different layers.

- If the previous step is repeated, setting <Layers> now to 2 layers, and if then the <Layers> control is brought back to its maximum setting, ie. 6 layers it can be seen that the JPEG image, although having the same size as selected with the first compression process, has degraded in quality. The JPEG2000 image, has the same quality as from the first compression process. The <Zoom> slider can be used to make this more visible.

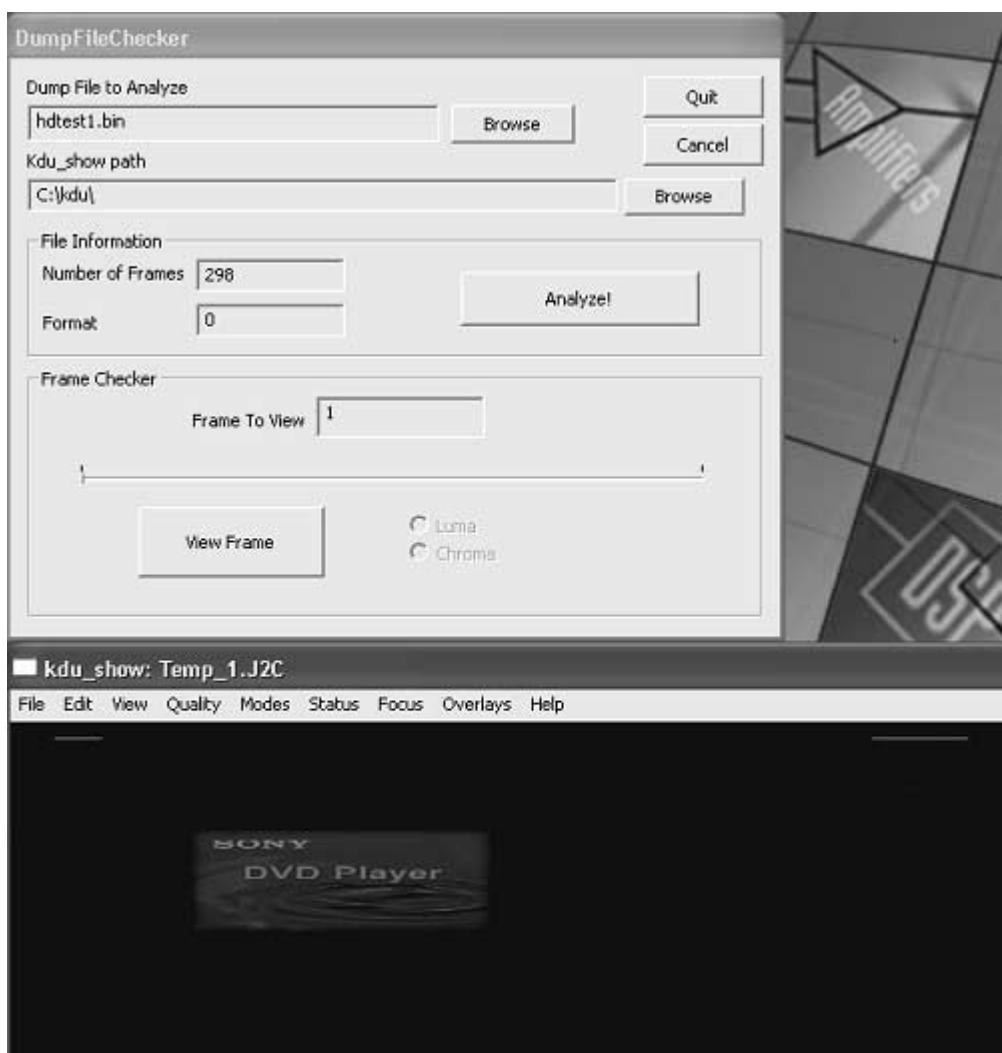
The JPEG2000 stream contains different resolutions and compression rates in one single JPEG2000 stream and therefore it is possible to call up a required file size without having to go through a new compression process and therefore degrading the image with each process further.

6 UTILITIES

DumpFileChecker and HIPI-SourceCreator are distributed with Alberio.

DumpFileChecker

DumpFileChecker allows files having been compressed with the <ADI Compressed Stream Render> filter to be checked for errors.



HIPI Source Creator

In order to use the Still Image feature with Graph Edit, HIPI Source Creator will allow the user to convert any .bmp, jpg, gif or .png file into an ADV202 compatible raw data file.

The image can be repeated in setting the <Frames per File> value.

Resolutions up to 16-bit are possible.

All possible ADV202 HIPI interface modes are supported as well.

