DIGITAL VIDEO WORKFLOW

Presented by:

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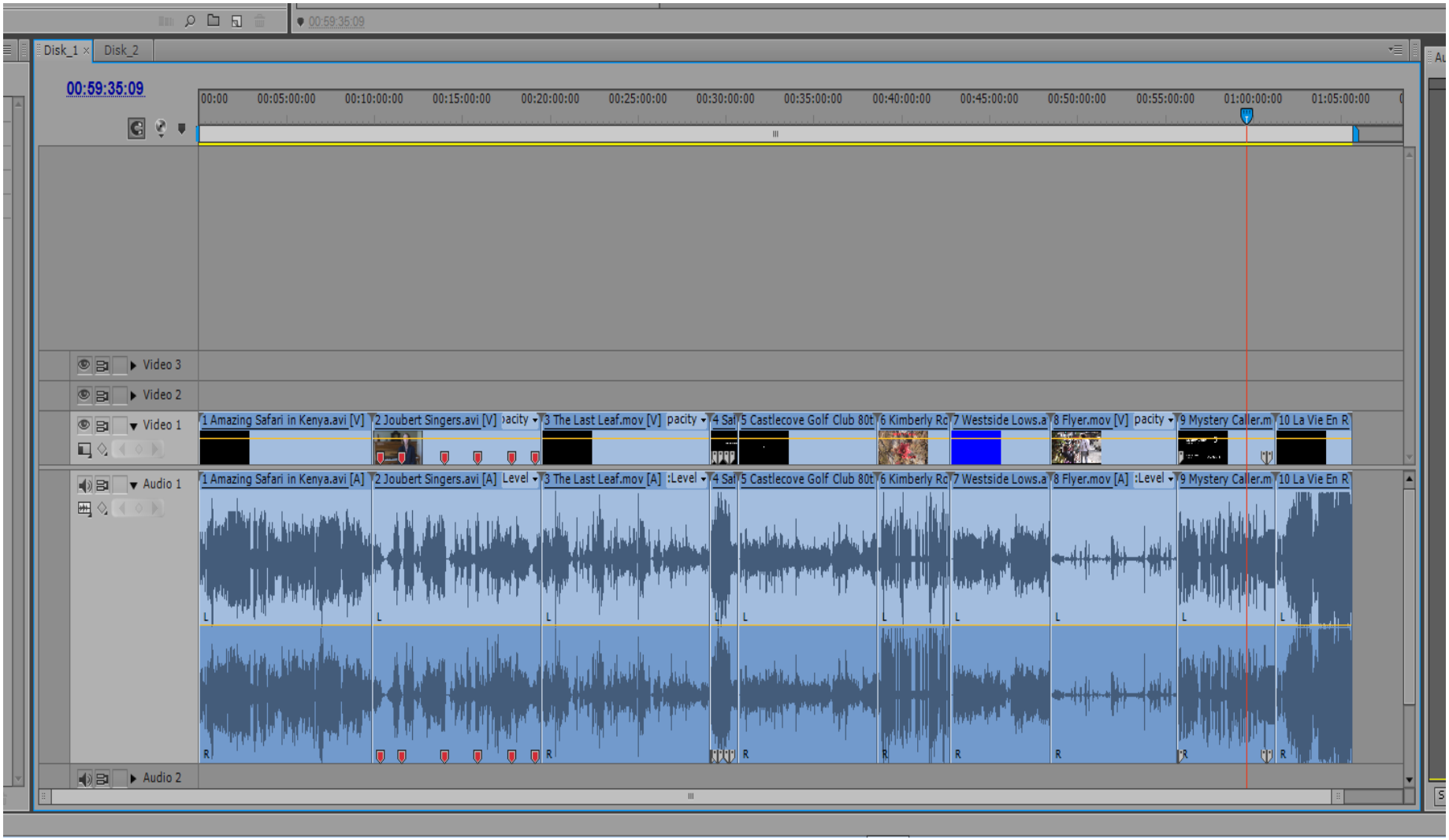
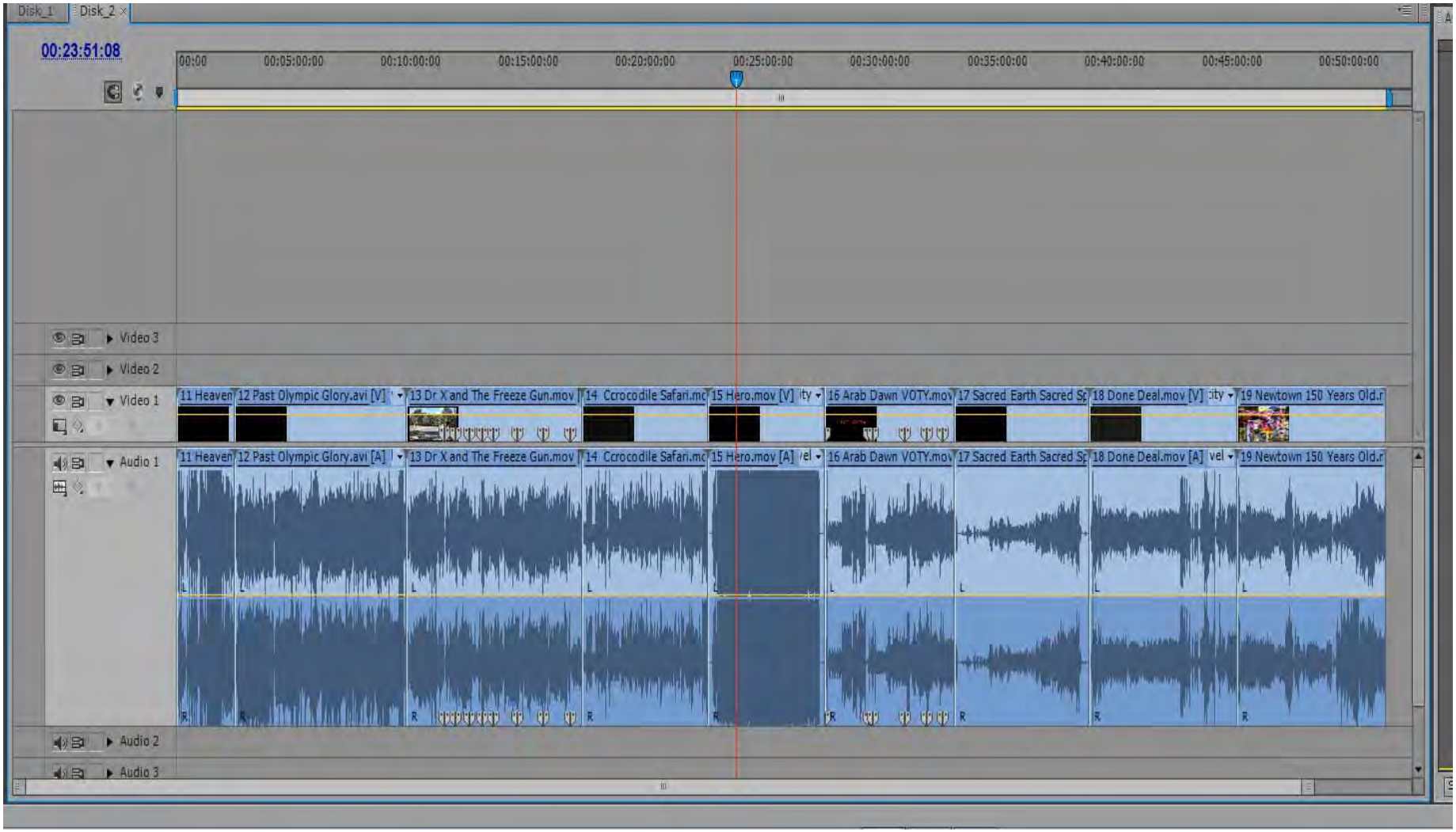
Problems with VOTY 2012 video files

Title	Wrapper	Shape	CODEC	Ingested	Pixel Width	Pixel Height	Aspect	CODEC owner
Amazing Safari in Kenya	avi	16x9	dvsd	08/11/2012	720	576	1.4587	MS DV
Joubert Singers	avi	16x9	CFHD	08/11/2012	720	576	1.4587	Cineform
The Last Leaf	mov	16x9	avc1	08/11/2012	1280	720	1.0000	H264
Satisfaction Guaranteed	mov	16x9	avc1	08/11/2012	1920	1080	1.4587	H264
Castlecove Golf Club 80th Anniversary	mov	16x9	dvcp	08/11/2012	1024	576	1.0940	Apple DV
Kimberley Rose	mov	16x9	jpeg	08/11/2012	1049	576	1.0000	Apple Photo JPEG
West Side Lows	avi	16x9	dvsd	08/11/2012	720	576	1.4587	MS DV
Flyer	mov	16x9	dvcp	08/11/2012	1024	576	1.0940	Apple DV
Mystery Caller	mov	16x9	avc1	08/11/2012	1920	1080	1.0940	H264
La Vie En Rose - Dahlia Dior	mov	16x9	avc1	08/11/2012	1920	1080	1.0000	H264
Heavenly Conversation	avi	16x9	dvsd	09/11/2012	720	576	1.4587	MS DV
Past Olympic Glory	avi	4x3	dvsd	09/11/2012	720	576	1.0940	MS DV
Dr. X and The Freeze Gun	mov	16x9	avc1	09/11/2012	1280	720	1.0940	H264
Crocodile Safari	mov	16x9	SVQ3	09/11/2012	1280	720	1.0000	Sorenson
Hero	mov	16x9	dvcp	09/11/2012	720	576	1.4587	Apple DV
Arab Dawn	mov	16x9	avc1	09/11/2012	1920	1080	1.0940	H264
Sacred Earth Sacred Spirit	mov	16x9	dvsd	09/11/2012	720	576	1.4587	MS DV
Done Deal	mov	16x9	SVQ3	09/11/2012	1280	720	1.0000	Sorenson
Newtown 150 Years Old	m2ts	16x9	mpeg2	09/11/2012	1920	1080	1.0000	mpeg2

Problems with VOTY 2012 audio files: First Half

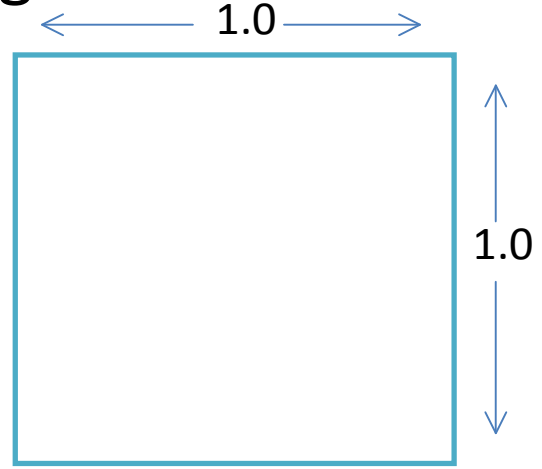


Problems with VOTY 2012 audio files: 2nd Half



Aspect Ratio HD

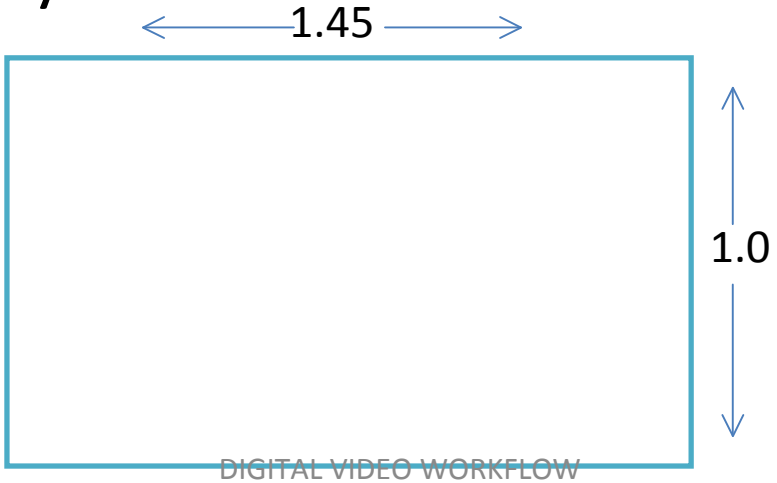
- Aspect ratio is refers to the shape of the pixels in your video
- A square pixel has an aspect ratio of 1:1 and should be used in all high definition video



- All modern panel TVs and PCs have square pixels

Aspect Ratio SD

- Non-square pixels are used in standard definition video
- This is to reduce data requirements while still getting the correct aspect ratio
- Standard definition 16x9 video has an aspect ratio of approximately 1.45:1



Result of Incorrect Aspect Ratio

- The most obvious result will be weird-shaped people

Right

Wrong

- You might argue that the one on the right is better, but I don’t like it!

HD Pixel Numbers: Resolution

- HD pictures should be either:
  - 1920 x 1080 pixels for full HD
  - 1280 x 720 for acceptable HD
- All HD pictures should be progressive, not interlaced unless you have a specific reason for making them interlaced
- All modern playback devices are progressive

SD Pixel Numbers: Resolution

- SD pictures should only be 720 x 576 pixels
- Unless you know what you are doing, the pictures should be interlaced

MOV and AVI

- MOV is the standard Apple Quicktime file type
- AVI is the standard Windows file type
- If in doubt, use the standard for your computer type
- In the technical world, Quicktime MOV has a few issues with colour profiles whilst AVI files don’t, but this is not important for most of us

Files and CODECs

- The video media will contain files of some description:
  - AVI;
  - MOV;
  - MPEG
- Each of these file types will contain one of many CODECs. The vast bulk of the combined video and audio files we use will be use either
  - mpeg2 or
  - mpeg4 compression
- Further, most cameras we have access to use the AVCHD CODEC which is a subset of the H.264 CODEC and is usually inside an is an MPEG4 file with suffix '.mts'
- Other formats for stills might be .jpg or .psd and for audio, either .wav of .aif. Note that camera raw files can seldom be understood by video editors.

Camera CODECs

- The camera sensor produces too much data to record directly onto the chosen media;
- The data must therefore be reduced before it can be recorded;
- The thing that reduces the data to a manageable size is called a CODEC – short for code-decode;
- The CODEC squashes the video and audio data into a manageable volume of data.

Camera CODECS

- Cameras that we use either the MPEG2 CODEC or the H264 CODEC (or in one case, DVCPRO CODEC);
- They have file names with suffixes like .AVI, .MOV, .MTS, .M2T
- MPEG2 is the same CODEC that we see on DVDs – it is the older and less efficient of the two MPEG CODECs;
- H264 is the presently the most common CODEC and is most often seen as a sub-set called AVCHD;
- Both are lossy CODECs – they throw away a lot of the original video and audio information in the CODE-ing process before the camera records it;
- When the video and audio are played back the data is DECODE-d to try to recreate the original picture.

Other File Types of Members

- Canon DSLRs use MOV files with MPEG2 CODEC data inside
- Panasonic GH3 uses MOV files with H.264 CODEC data inside
- Panasonic P2 cameras have a proprietary Panasonic CODEC ‘DVCPRO’

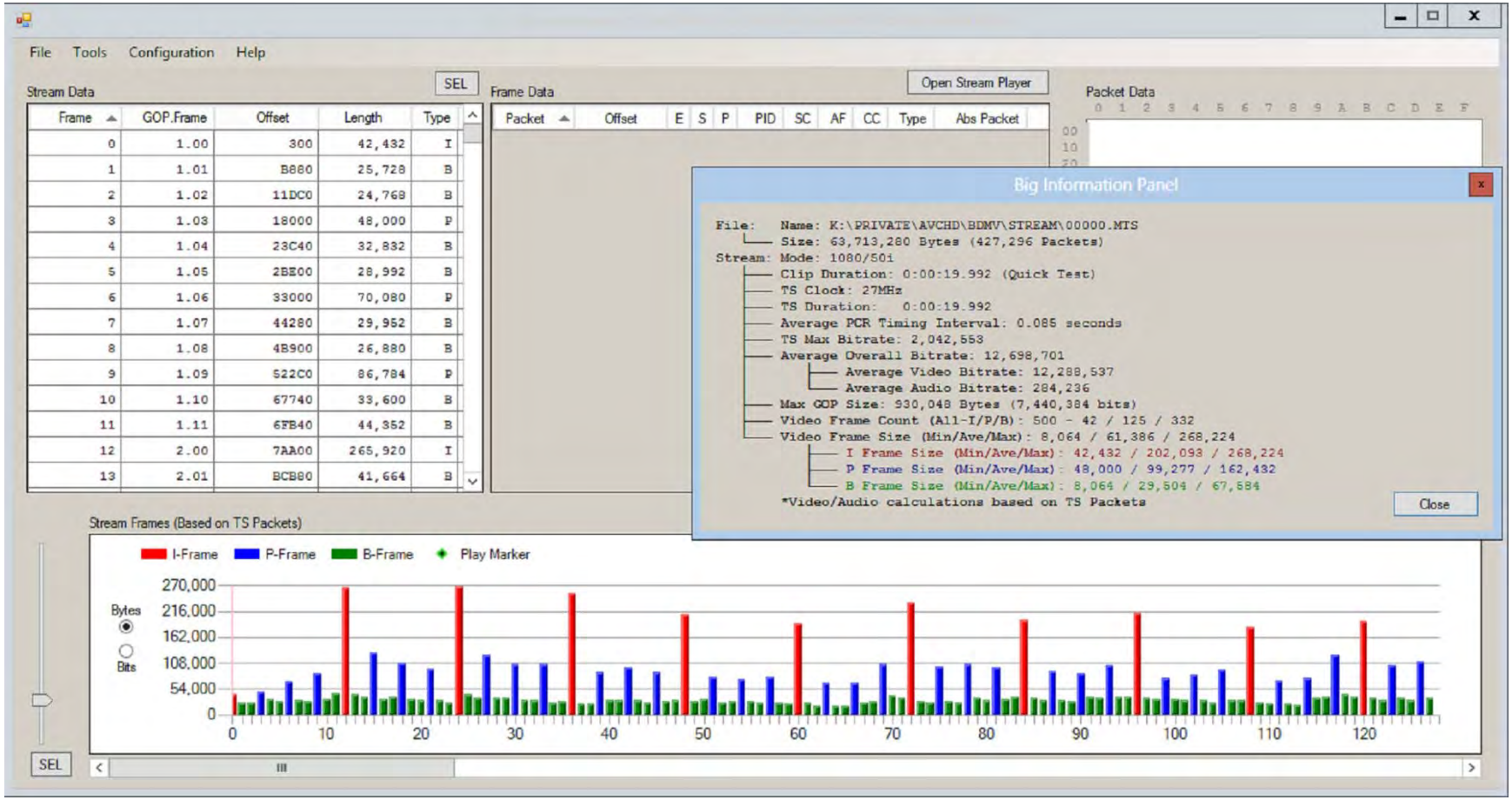
GOPs

- A GOP is a group of pictures
- CODECs can be either long GOP or I frame
- Long GOP means that there is less than one frame of video recorded for every frame taken
- I frame means one recorded frame for every frame taken
- Both use lossy compression – they throw away some data

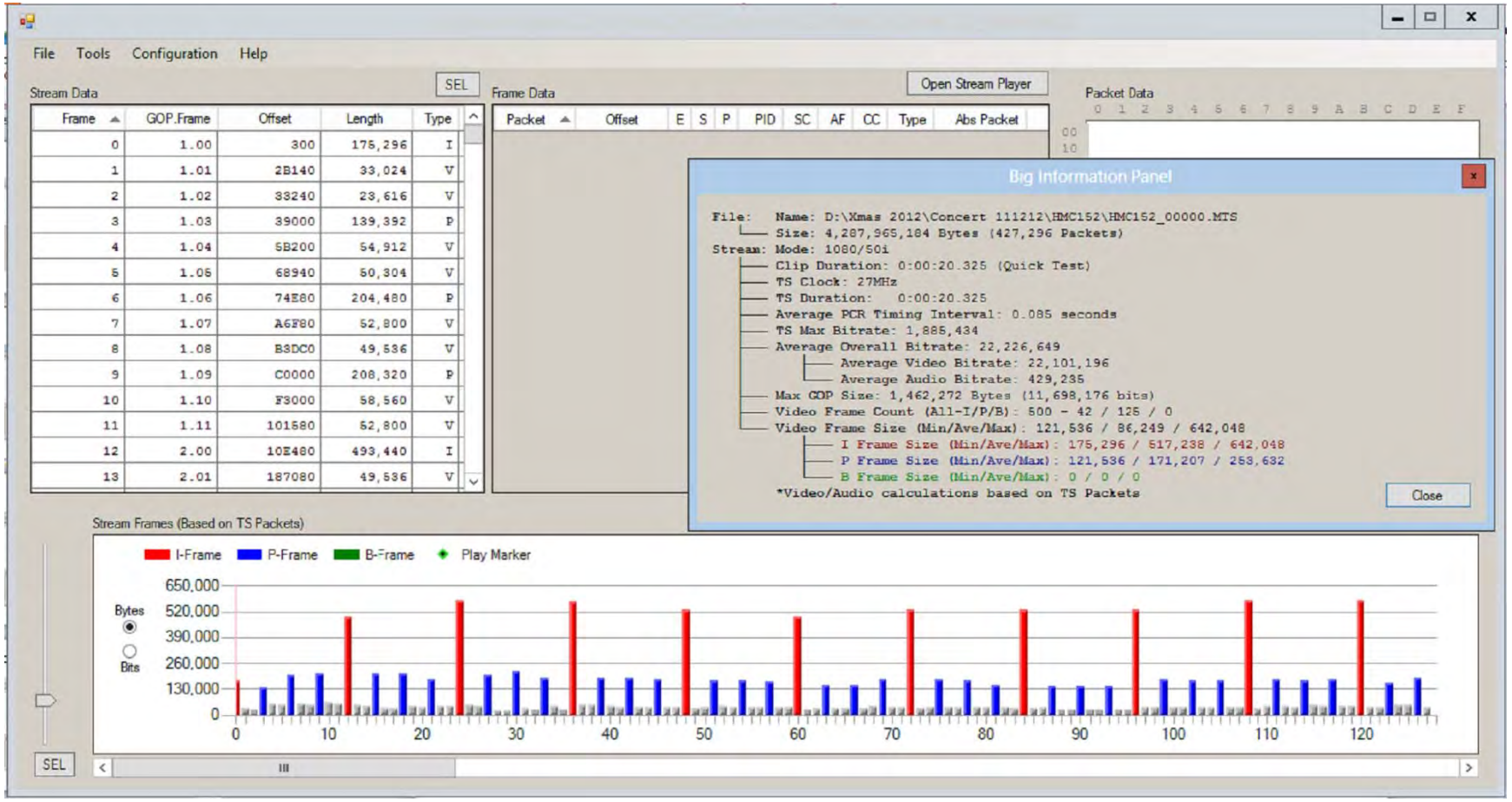
Frames in a GOP

- Wikipedia says:
  - **I**-frames are the least compressible but don't require other video frames to decode.
  - **P**-frames can use data from previous frames to decompress and are more compressible than I-frames.
  - **B**-frames can use both previous and forward frames for data reference to get the highest amount of data compression

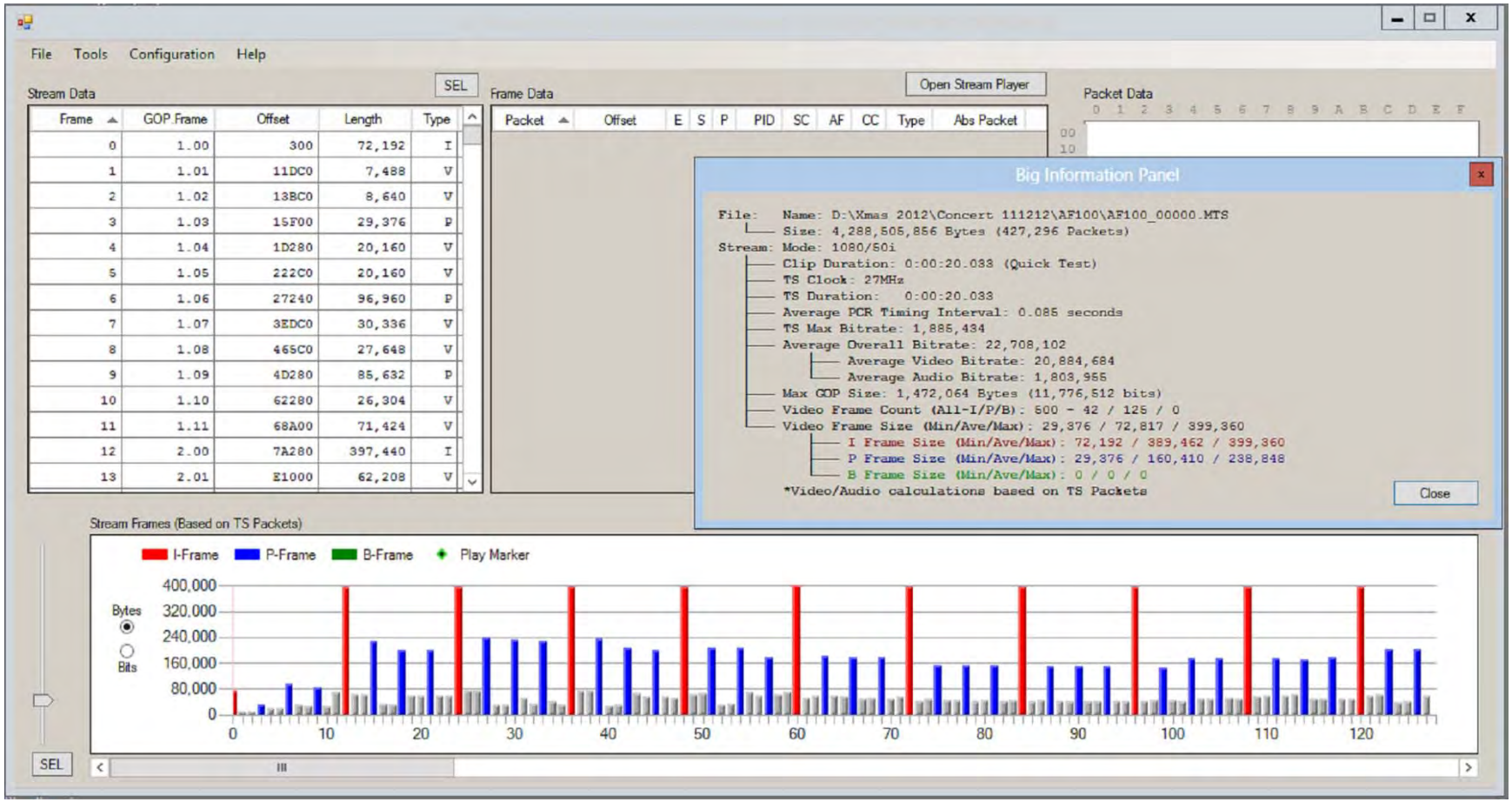
Data Profile Panasonic SD700



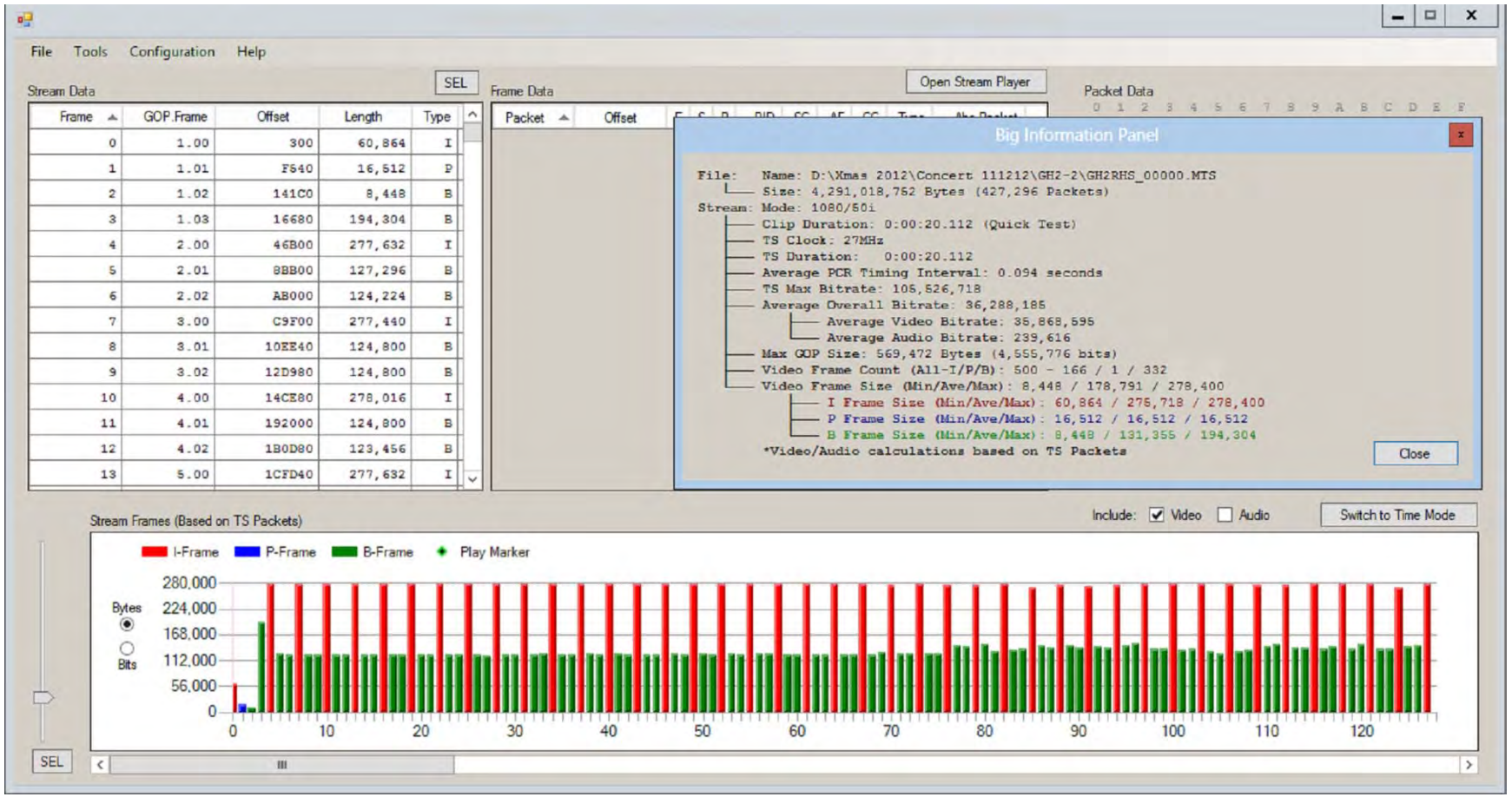
Data Profile Panasonic HMC152



Data Profile: Panasonic AF100



Data Profile Panasonic GH2 (hacked)



CODECs

- Unless you know what you are doing, you should edit your video in the same CODEC it was recorded in
- The dominant CODEC will be AVCHD
- AVCHD is related to Blu-Ray but is not used by DVDs

Editing Questions

- Do you know what file type you are using in your editor?
- Do you know what CODEC your file type contains?
- Are you editing with the same file type that your camera produced?
- Have you set up your editor with the correct resolution and aspect ratio?
- Why edit in the same format as your camera shoots?

Output Workflow

- What device will you be viewing the output on?
  - TV/projector
  - Computer
  - Internet/mobile device
- Each requires planning and may require a different output format, and therefore a different CODEC

Output Workflow

- The output process in your video editor will have a number of presets
- Make sure that you choose a preset that will produce a video suitable for the appliance that it will be played on
- In more advanced editors, you can create and store presets if you can’t find the one you need

Vimeo Video: Internet/mobile device

- Vimeo has tutorials for creating output to be uploaded to Vimeo, from the most common NLEs (this is useful for any streaming video)
- These can be found at:
  - https://vimeo.com/help/compression

Vimeo Video: Internet/mobile device

- CODEC: H.264
  - "A codec is the format in which your video will be encoded. Vimeo accepts most major video codecs, but for best results we recommend using H.264. If you're uploading High Definition (HD) video, choose the High Profile H.264 setting instead of Main Profile"
- CODECs that don't work:
  - "Here are come codecs that will not work on Vimeo: Go2Meeting, Canopus HQ, Apple Intermediate Codec"

Vimeo Video: Internet/mobile device

- Frame rate: 24, 25, 30 FPS (Constant)
  - "Vimeo accepts videos with frame rates of 24 (or 23.976), 25, and 30 (or 29.976). If you know the frame rate of your footage, it's best to encode your final video at the same frame rate. However, if your video exceeds 30 FPS, you should encode your final video at 30 FPS. … If there is an option for keyframes, choose the same value you used for frame rate. …"
- Bit rate: 2,000-5,000 kbps (SD)/5,000-10,000 kbps (720p HD)/10,000-20,000 kbps (1080p HD)
  - Bit rate … controls both the visual quality of the video and its file size. In most video editors, this is measured in kilobits per second (kbps). When you have the option, choose a 'variable' bit rate and set the target to at least 2,000 kbps for standard definition (SD) video or 5,000 kbps for HD. …"

Vimeo Video: Internet/mobile device

- Resolution: 640 pixels wide (SD) or 1280 pixels wide (HD)
  - Common resolutions for SD video include 640x480 px (4x3 aspect ratio) and 640x360 px (16x9 aspect ratio). The most common setting for HD video is 1280x720 (16:9 aspect ratio). … 1920x1080 px is the most common resolution for 1080p video.

Format	Resolution	Bit Rate
Standard Definition (SD) 4:3 aspect ratio	640 x 480 px	2,000-5,000 kbps
Standard Definition (SD) 16:9 aspect ratio	640 x 360 px	2,000-5,000 kbps
720p HD Video 16:9 aspect ratio	1280 x 720 px	5,000-10,000 kbps
1080p HD Video 16:9 aspect ratio	1920 x 1080 [x	10,000-20,000 kbps

Vimeo Audio: Internet/mobile device

- Codec: AAC-LC (Advanced Audio Codec)
  - "For best results, we recommend using AAC-LC (low complexity) for the audio codec. …"
- Data Rate: 320 kbps
  - "For best results, encode your audio at constant rate of 320 kbps."
- Sample rate: 48kHz
  - "For best results, set your audio sample rate to 48kHz. If your working setting is already less than or equal to 48kHz, leave it as is."

Output to Optical Disk: TV/Projector

- We use either DVD disks or Blu-Ray disks.
- DVDs that will play in most DVD players are standard definition and are a highly controlled format
- They use MPEG2 CODEC, can be either 30 FPS (NTSC colour system) or 25 FPS (PAL colour system) and are 720 x 480 px interlaced (NTSC colour system) or 720 x 576 px interlaced (PAL colour system) – obviously we use the PAL standard
- Make sure that you choose the right preset for the disk you are creating – for instance, don't choose an NTSC preset for a DVD that will be played in Australia!

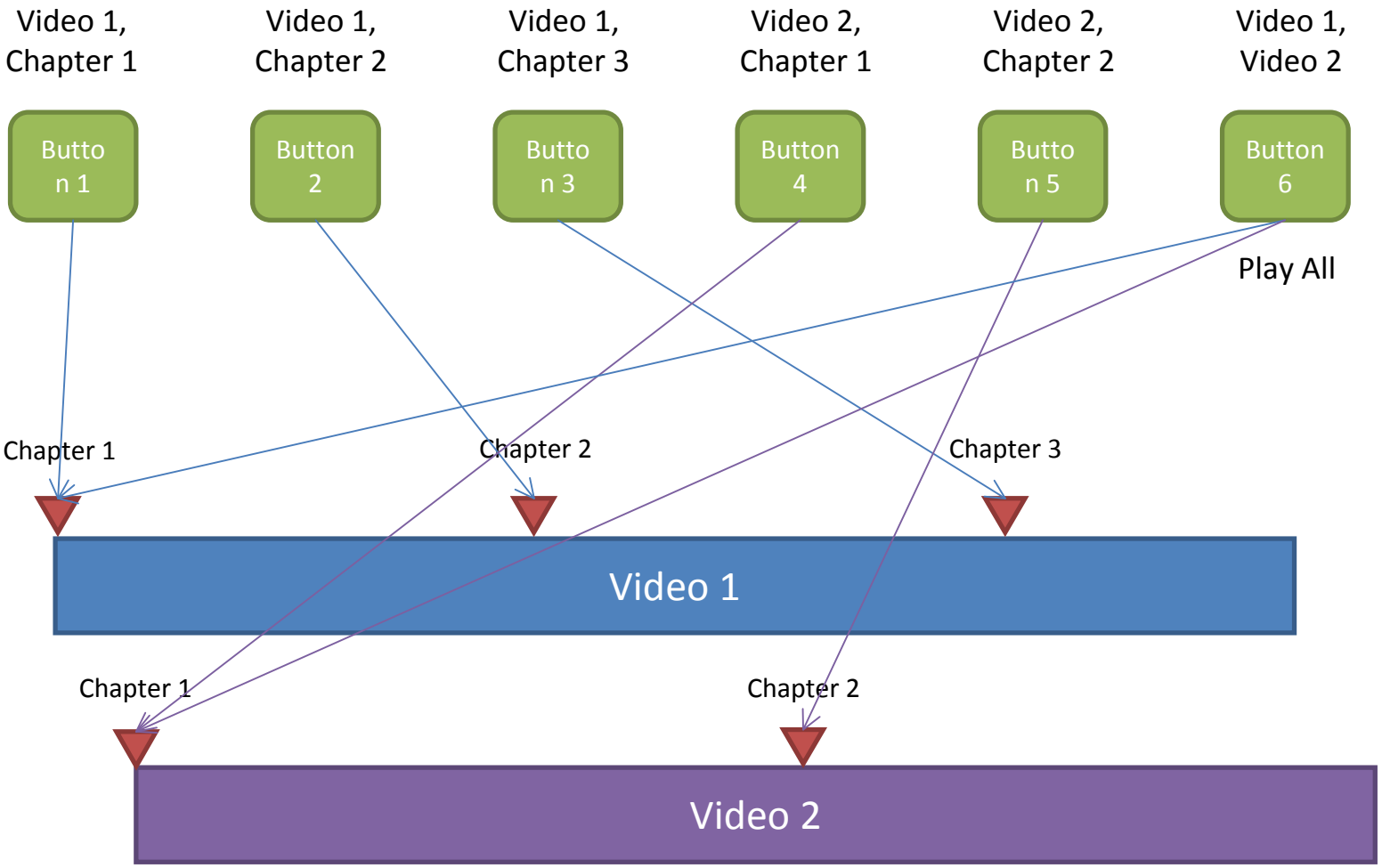
Output to Optical Disk : TV/Projector

- Blu-Ray is more versatile
- It can accommodate different resolutions such as 720 x 576px, 1280 x 720 px, 1920 x 1080 px
- It can be encoded with either MPEG2 or H.264
- It can be both progressive or interlaced, but progressive is generally better.

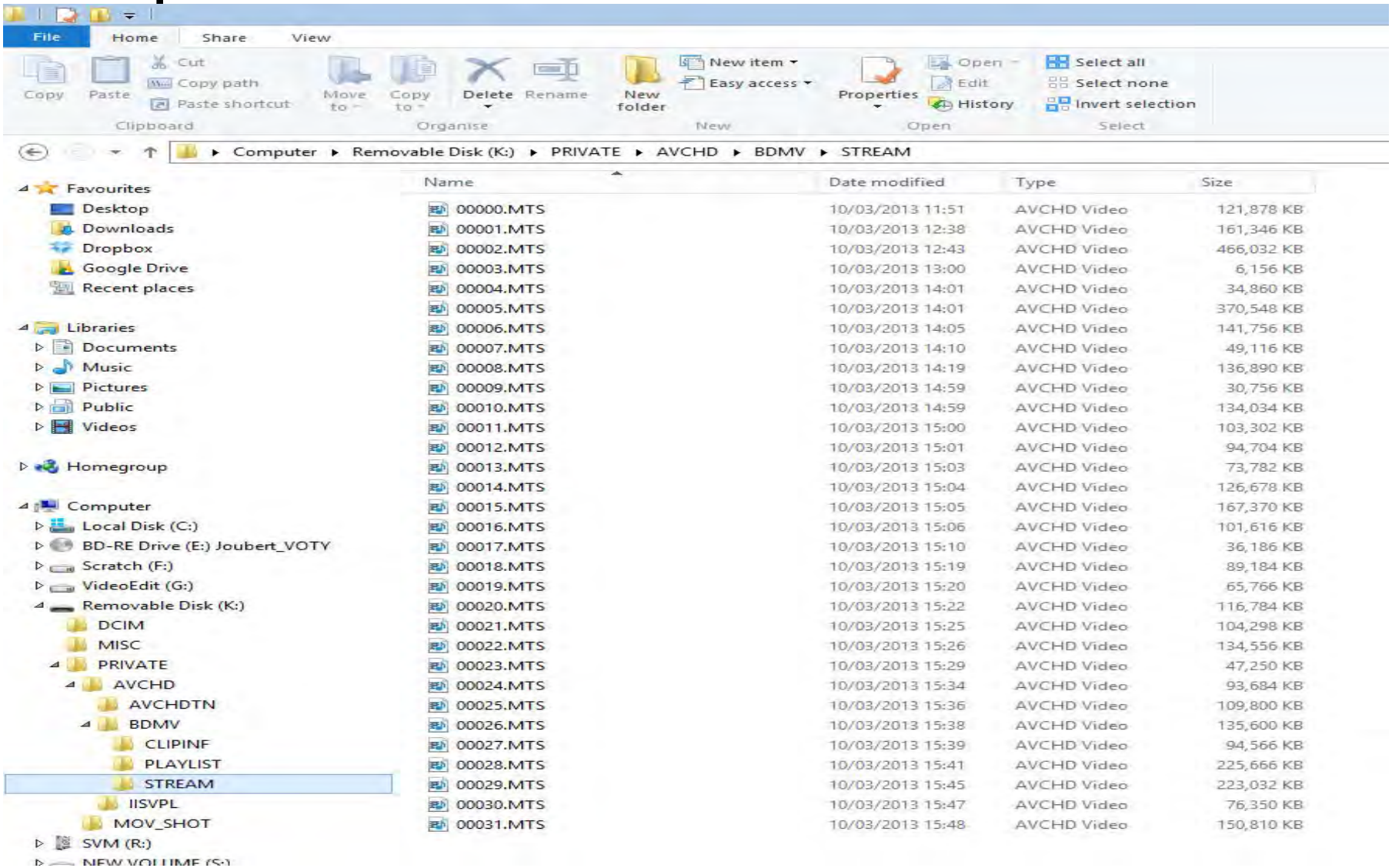
Output to Optical Disk: Computer Data Disk

- Both disk types can be used for computer data – in this case they are just like a computer hard disk and contain computer files
- These are a possible backup media (but large hard drives are now cheaper options)
- Optical disks in data format **cannot be read** by standard DVD or Blu-Ray players

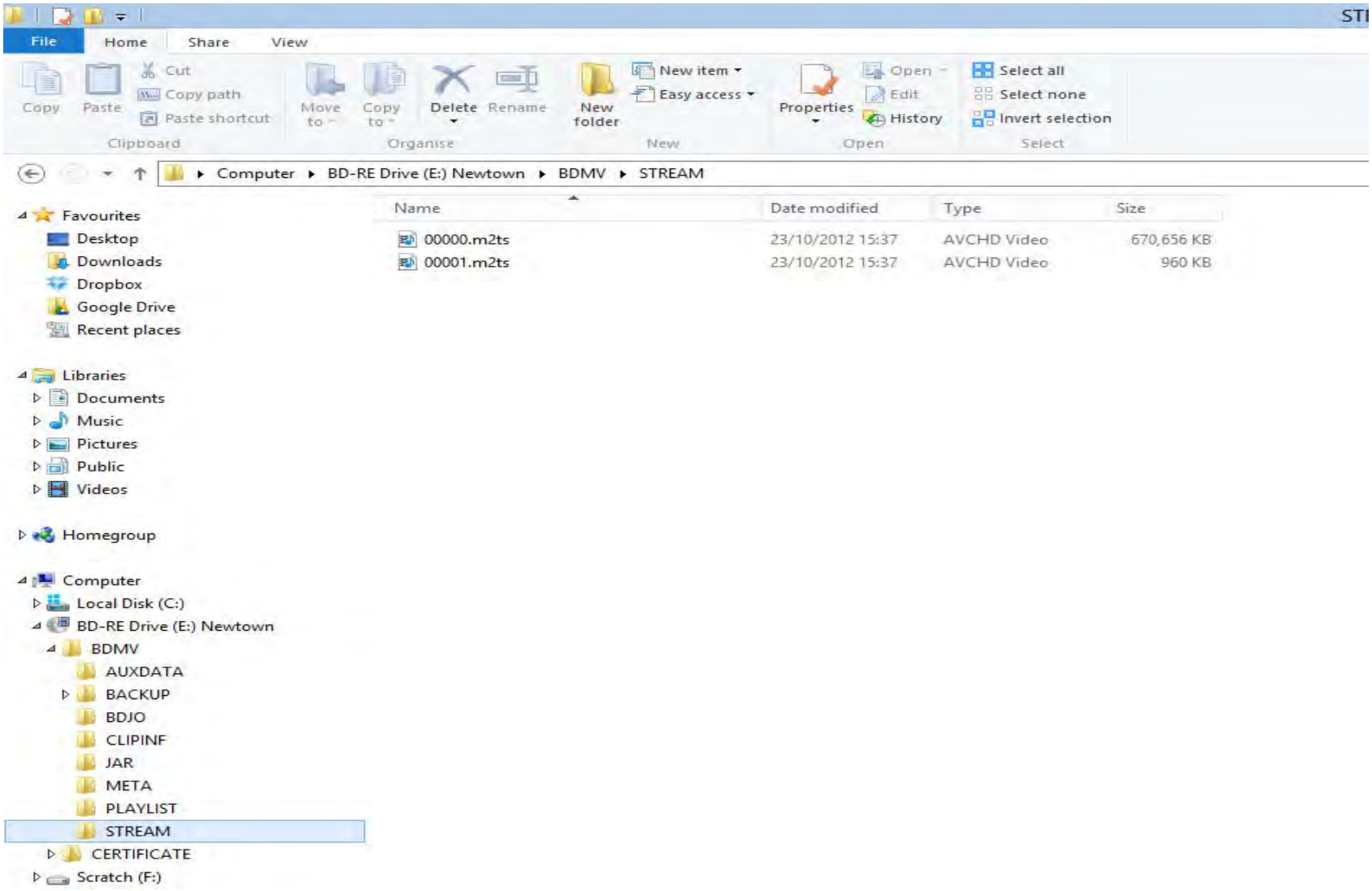
DVD/Blu-Ray structure



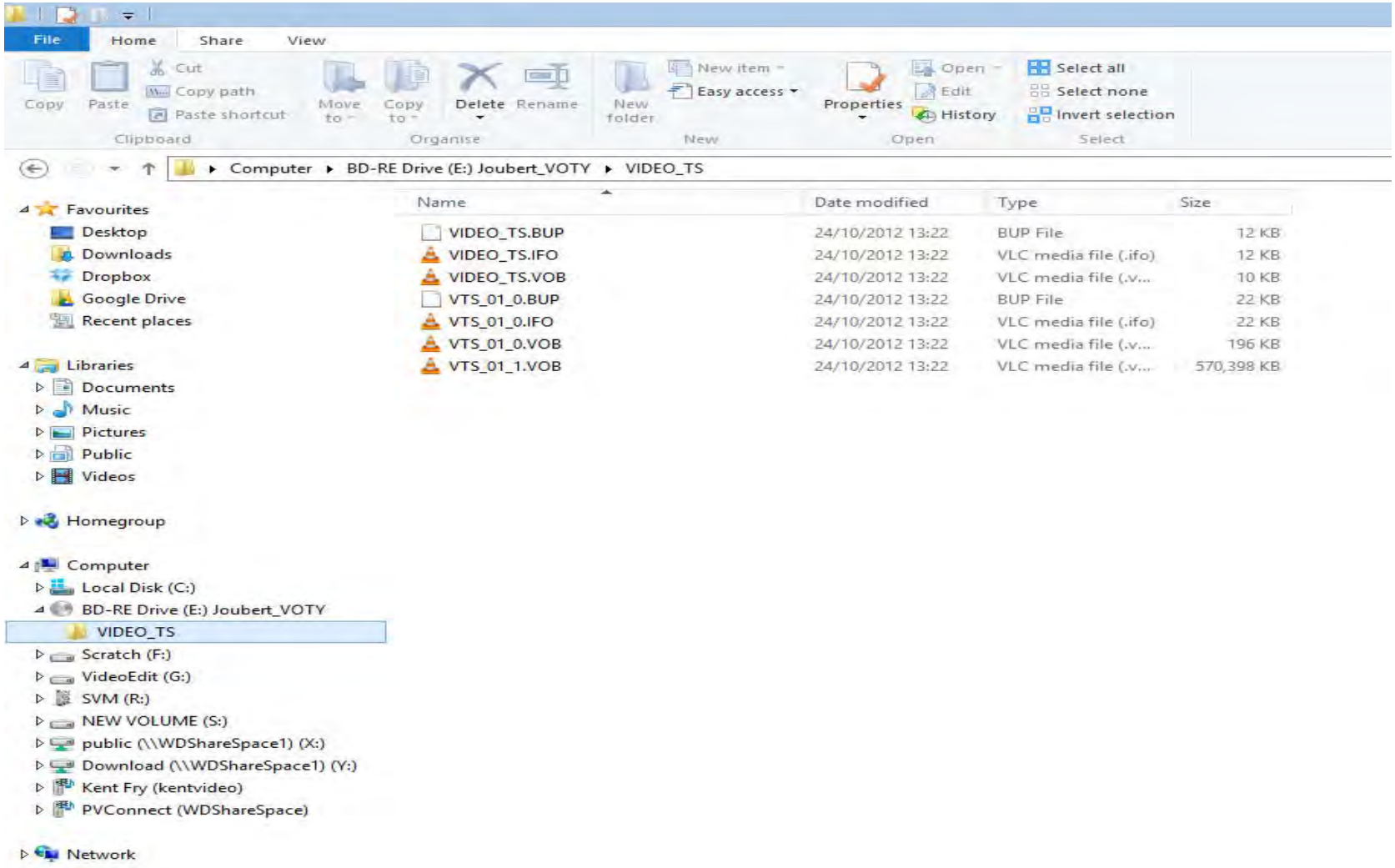
Optical Disk File Structures: Camera



Optical Disk File Structures: BluRay



Optical Disk File Structures: DVD



Output Workflow Questions

- Do you understand the CODEC and file type requirements of the appliance on which your video will be played?
- Do you have a preset in your editor that will render out the correct file type?
- Have you created a nice background for your disk menu, or will you use a stock one from your editor?
- Have you linked the play buttons for the disk to the correct videos?

Summary

- Make sure that your output complies with these guidelines
  - Video
  - Audio
- Check the Vimeo website to see presets in your editor
- Understand the digital demands of your system: camera to computer to output