

# **User Manual**



## **SyncCert Audio/Video Synchronization Checker**

**071-2089-00**

This document supports software version 1.0

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# Table of Contents













Environmental Considerations .....	v
Preface.....	vii
Related Material.....	vii
Manual Convention.....	viii
Numbering Conventions .....	viii
User Documentation .....	ix

## Introduction

<b>Overview .....</b>	<b>1-1</b>
Features and Benefits .....	1-2
Applications .....	1-2
<b>Software, Hardware, and User Prerequisites .....</b>	<b>1-3</b>
Personal Computer Prerequisites .....	1-3
User Prerequisites .....	1-4
<b>Installation and Licensing .....</b>	<b>1-5</b>
License Types .....	1-5
Installing the SyncCert Software .....	1-5
<b>Compression Standards and File Types.....</b>	<b>1-7</b>
Supported Video Compression Standards.....	1-7
Supported Audio Compression Standards .....	1-15
Permitted Video Types/Formats .....	1-17
Permitted Audio Types/Format.....	1-24
Standards References .....	1-26

## How to Use SyncCert

<b>How to Use SyncCert .....</b>	<b>2-1</b>
Window Elements .....	2-2
Starting to Use SyncCert.....	2-3
Audio waveform View (  ).....	2-8
Main Menu.....	2-11
<b>File Menu .....</b>	<b>2-13</b>
Open Stream...  Ctrl+O .....	2-13
Close Stream .....	2-29
Preferences .....	2-29

Example Files.....	2-29
Export A/V Delay Streams.....	2-30
Recent File.....	2-31
Exit.....	2-31
<b>Play Menu.....</b>	<b>2-33</b>
Audio/Video Synchronization.....	2-34
Play  Ctrl+P.....	2-34
Fast Forward  Ctrl+F.....	2-35
Stop  Ctrl+S.....	2-36
Pause/Step Forward  Ctrl+A.....	2-36
Fast Backward  Ctrl+Shift+F.....	2-36
Pause/Step Backward  Ctrl+Shift+A.....	2-37
Continuous Play.....	2-37
Pause on Frame...  .....	2-37
Video Decoder Options.....	2-38
Audio Decoder Options.....	2-44
Mute audio  .....	2-45
Synchronize audio  .....	2-46
<b>Analysis Menu.....</b>	<b>2-47</b>
Video Summary Tooltip  Ctrl+U.....	2-47
Audio Summary Tooltip.....	2-50
Summary Tooltips Manipulation.....	2-51
Audio/Video Delay Status.....	2-53
Analysis Options... ..	2-54
View Video Navigator... ..	2-55
View A/V Delay Analysis... (  ).....	2-58
<b>Alert Menu.....</b>	<b>2-59</b>
Alert Levels.....	2-59
View Alert Log  .....	2-62
<b>Window Menu.....</b>	<b>2-66</b>
Quickly Switch Windows.....	2-66
Cascade, Tile, Arrange Icons, Close All.....	2-67
Toolbars.....	2-69
Status Bar.....	2-69
Video Scale.....	2-70
Graph View Settings.....	2-71



Synchronize views .....	2-72
Active Views.....	2-72
<b>Help Menu .....</b>	<b>2-73</b>
User manual (PDF) .....	2-73
Tutorials (PDF) .....	2-73
License manager... ..	2-73
About SyncCert.....	2-74
Icon Toolbars .....	2-74
Status Bar .....	2-76
Ctrl Shortcut Keys.....	2-77
Alt Menu Keys.....	2-77

## Command Line / Batch Mode

<b>Command Line/Batch Mode.....</b>	<b>3-1</b>
Command line mode .....	3-1
Batch mode .....	3-1
Running SyncCert in command line/batch mode.....	3-1

## Index



# Environmental Considerations

This section provides information about the environmental impact of the product.

## Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

**Equipment Recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



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## Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. Although not required, this product complies with the RoHS Directive requirements for nonexempt products.



# Preface

This manual describes the functions and use of the Tektronix SyncCert Audio/Video Synchronization Checker.

The manual is organized into the following sections:

- Section 1: Introduction, Software, Hardware and User Prerequisites, Installation and Licensing, and Compression Standards and File Types
- Section 2: How to Use SyncCert
- Section 3: Command Line/Batch Mode

## Related Materials

Additional documentation, such as ReadMe files, may be included on the installation CD-ROM. The archiving utility 7-Zip is also included on the CD-ROM.

The following URLs access the Web sites for the standards organizations listed (the URLs listed were valid at the time of writing):

- MPEG-2 standards (International Organization for Standards)  
<http://www.iso.ch/>
- DVB standards (European Technical Standards Institute)  
<http://www.etsi.org/>
- ATSC standards (Advanced Television Systems Committee)  
<http://www.atsc.org/>

## Manual Conventions

Naming conventions for the interface elements are based on standard Microsoft Windows naming conventions. Naming conventions for MPEG-2, ATSC, and DVB structures follow the conventions derived from the referenced standards documents.

Mono-spaced text can indicate the following:

- Text you enter from a keyboard  
Example: Enter the network identity (`http://TSMonitor01`)
- Characters you press on your keyboard  
Example: Press CTRL+C to copy the selected text.
- Paths to components on your hard drive  
Example: The program files are installed at the following location:  
`C:\Program Files\Tektronix\`

## Numbering Conventions

Within SyncCert, all numbers are decimal unless they are preceded by 0x, in which case they are hexadecimal.

For example:

- 16 [decimal] = 16 decimal
- 0x16 [hexadecimal] = 22 decimal

## User Documentation

The information in this manual is also provided in the SyncCert Help system (press F1).

The PDF version of this manual can be also accessed from SyncCert Help menu > User manual (PDF).

The PDF version of this manual is provided:

- Because it is sometimes easier/clearer to navigate through a PDF document than the standard Windows Help system
- So that you can easily print out additional copies of the manual

Tutorials are supplied as a separate PDF file accessible through the Help menu.

The PDF version of this manual and the tutorials are also on the installation CD-ROM.







# Introduction



# Overview

Compressed digital content is complex, including different standards, resolutions, formats, color-spaces, metadata, with different video and audio.

When this digital content passes through a broadcast center, there are often several stages of de-multiplexing, encoding, decoding, and re-multiplexing. At any stage it is possible that the time relationship between the audio and video is shifted or lost. This is most obviously displayed with lip-sync, but can of course occur with any audio/video type.

Such errors are very annoying to users and may mean that they will complain or be reluctant to pay for premium content. These errors may also be the first time that a broadcaster becomes aware of an audio/video synchronization problem. By the time a lip-sync error can clearly be seen on-screen, there is a substantial loss of audio/video sync. Such errors can build up over a period of time. SyncCert allows synchronization errors as small as one millisecond. SyncCert can detect errors early and remedial action can be taken long before anything is noticeable on-screen.

SyncCert provides a set of test audio and video files in common formats, which can be played through the broadcast chain, captured, and automatically analyzed. These video streams are designed to be passed through the broadcast chain exactly the same as any other digital video stream.

SyncCert displays a graph of audio/video sync over time, and can generate alerts based upon a user-settable threshold for sync error.

SyncCert automatically identifies the video frame number and audio frame number based upon embedded codes: these codes are then used to measure the audio/video sync and report this to the alert mechanism, alert log and in the various displays.

SyncCert can analyze the test files which have been captured at various points in the broadcast chain, so that the broadcaster can identify which area is causing the loss of A/V sync.

SyncCert allows the alert limits on audio lead and lag to be separately specified, as audio lead is more noticeable than audio lag.

## Features and Benefits

- SyncCert is a system for checking/measuring audio/video synchronization of file-based digital video content.
- Provides a systematic, reliable, and accurate means of detecting audio/video synchronization errors well before they are severe enough to be visually detectable.
- Can be set to run in batch mode to do repeated or timed checks.
- A test video is provided in various common formats including uncompressed, compressed MPEG-2 and MPEG-4/AVC, both at standard definition (SD) and high definition (HD) (both 720p and 1080i) and also 4:2:2 and 4:4:4.
- Logs errors with programmable alarm threshold.
- Analysis software runs on standard Windows™ PCs

## Applications

**Broadcasters:** For checking audio/video synchronization after capture at any point in the broadcast chain.

**Content Providers:** For checking production/encoding chain to ensure that it is not introducing audio/video synchronization errors.

# Software, Hardware, and User Prerequisites

SyncCert runs under the Microsoft Windows operating system and has been tested on:

- Windows XP (Home and Professional)
- Windows 2000 Professional

SyncCert is not supported under any other operating system.

## Personal Computer Prerequisites

SyncCert will work satisfactorily on relatively modest PC systems (for example, 800 MHz).

However, to decode and display CIF (Common Intermediate Format) video streams in real time, the following minimum PC configuration is recommended for MPEG-4 and H.263 format video:

- Processor speed >1.5 GHz
- Memory at least 256 MB RAM
- Screen resolution at least 1024x768
- 400 MB minimum hard disk space

For H.264/AVC with CIF-size video (and larger) and MPEG-2 with D1-size video (and larger), the processing requirements are significantly higher and therefore a higher performance PC is required to display the video in real time. For these, a PC with processor speed of at least 2.5 GHz is recommended.

Video files can be large (hundreds of MB), so a large hard disk is needed:

- Hard disk speed: at least 7200 rpm
- Hard disk size: as required for high-speed access to the video files to be analyzed

## User Prerequisites

It is assumed that you understand the audio and video standards used by SyncCert in significant detail and can therefore interpret the information presented.

A list of references is provided (see *Compression Standards and File Types*, Section 5).

# Installation and Licensing

This chapter describes licensing and installation of SyncCert.

## License Types

To run SyncCert, you will need a software key (dongle) with the correct license permissions.

Two types of software key are available; they perform the same function.

- Parallel port device - This plugs into the PC's parallel port. If a printer is already attached to the port, the software key can be interposed between the port and the printer connector.
- USB device - This plugs into a standard USB socket.

---

**NOTE.** *The software key contains the SyncCert license and embodies the value of SyncCert. If the software key is lost, you will have to purchase another software key, which may be at full list price of the software.*

---

All options are visible in the installed SyncCert menus. Options not enabled by the license will be unavailable (grayed out). The status and scope of the license can be checked at any time by clicking on the Help menu option License manager....

A node-locked license is locked to a particular PC, that is, SyncCert will only run on the PC on which a software key is installed. When using node-locked licenses, each PC that is to run SyncCert must have a separate node-locked license.

## Installing the SyncCert Software

1. Insert the SyncCert installation CD.

---

**NOTE.** *If the installation process does not start automatically, run `setup.exe` from the root directory of the installation CD.*

---

2. At the bottom of the window showing the readme file, click the Install button to start the installation.
3. The SyncCert installation will continue. When finished, reboot the machine.

Ensure that the software key (parallel port or USB) is fitted before starting SyncCert.





# Compression Standards and File Types

This chapter gives:

- A description of the video and audio standards (and elements within those standards) that SyncCert supports
- The video and audio file types that SyncCert can work with
- The exact titles and numbers of the standards on which SyncCert is based

## Supported Video Compression Standards

The video compression standards supported in this version of SyncCert are:

- H.264/AVC
- VC-1
- MPEG-4 Part 2
- MPEG-2 Part 2
- H.263+, H.263

SyncCert will open container files (containing the above types of video):

- MPEG-2 Transport Stream (H.264/AVC, VC-1 Advanced profile, MPEG-2 Program Stream, MPEG-2 Packetized Elementary Stream, MPEG-2 Elementary Stream only)
- MP4 (MPEG-4 Part 2, H.263 Baseline only and H.264)
- 3GPP (MPEG-4 Part 2, H.263 Baseline only and H.264)
- VOB/MPEG-2 Program Stream (MPEG-2 only)
- Microsoft ASF files
- RCV files

SyncCert will also open uncompressed video files. See *Opening an Uncompressed Video File (any file extension)* on page 2-23 for more information.

SyncCert will also open audio files of the standards given in *Supported Audio Compression Standards* on page 1-15, and container files that have these types of audio within them.

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**NOTE.** *Not all container files support all types of audio listed under Supported Audio Compression Standards on page 1-15. See also Permitted Audio Types/Format on page 1-24.*

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### **H.264/AVC**

This version of SyncCert supports the following elements of the H.264/AVC standard. See Reference [13] under *Standards References* on page 1-26.

**H.264/AVC Profiles, Levels.** The following Profiles and Levels are supported:

<b>Profile</b>	<b>Levels</b>
Baseline	1 to 5.1 inclusive
Extended	1 to 5.1 inclusive
Main	1 to 5.1 inclusive
High	1 to 5.1 inclusive
High 10-bit	1 to 5.1 inclusive
High 4:2:2	1 to 5.1 inclusive
High 4:4:4	1 to 5.1 inclusive

**H.264/AVC Tools.** See Reference [13] under *Standards References* on page 1-26 for a description of these tools.

All tools are supported, as permitted in the H.264/AVC standard, listed below.

Tool	Baseline	Extended	Main	High	High 10	High 4:2:2	High 4:4:4
Profile and level indications: profile_idc constraint_set0_flag constraint_set1_flag constraint_set2_flag constraint_set3_flag level_idc	66 1 0 or 1 0 or 1 0 or 1 10 - 51	88 0 or 1 0 or 1 1 0 or 1 10 - 51	77 0 or 1 1 0 or 1 0 or 1 10 - 51	100 0 or 1 0 or 1 0 or 1 0 10 - 51	110 0 or 1 1 0 or 1 0 10 - 51	122 0 or 1 1 0 or 1 0 10 - 51	144 0 or 1 1 0 or 1 0 10 - 51
Slice types: I P B SP SI	Yes Yes No No No	Yes Yes Yes Yes Yes	Yes Yes Yes No No	Yes Yes Yes No No	Yes Yes Yes No No	Yes Yes Yes No No	Yes Yes Yes No No
NAL unit types: 1 - coded slice of a non-IDR picture 2 - coded slice data partition A 3 - coded slice data partition B 4 - coded slice data partition C 5 - coded slice of an IDR picture 6 - supplemental enhancement information 7 - sequence parameter set 8 - picture parameter set 9 - access unit delimiter 10 - end of sequence 12 - end of stream 13 - filler data	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes
Structural: data partitioning (NALU type 2-4) interlace (frame_mbs_only_flag)  arbitrary slice order slice groups (num_slice_groups_minus1) redundant coded pictures (redundant_pic_cnt_present_flag)	No No  Yes 1 - 8 Yes	Yes Yes (L2.1 - 4.1)  Yes 1 - 8 Yes	No Yes (L2.1 - 4.1)  No 1 No	No Yes (L1-2 & 4.2 - 5.1)  No 1 No	No Yes (L1-2 & 4.2 - 5.1)  No 1 No	No Yes (L1-2 & 4.2 - 5.1)  No 1 No	No Yes (L1-2 & 4.2 - 5.1)  No 1 No
Weighted prediction: weighted_pred_flag weighted_pred_idc	0 0	=> 0 => 0	=> 0 => 0	=> 0 => 0	=> 0 => 0	=> 0 => 0	=> 0 => 0
Entropy coding (entropy_coding_mode_flag): CAVLC CABAC	Yes No	Yes No	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
B frames: direct_8x8_inference_flag  MinLumaBIPredSize	n/a  n/a	1  8x8 L3.1 - 5.1	0 (L1-2.2) 1 (L3-5.1)  8x8 L3.1 - 5.1	1 (L3-5.1)  8x8 L3.1 - 5.1	1 (L3-5.1)  8x8 L3.1 - 5.1	1 (L3-5.1)  8x8 L3.1 - 5.1	1 (L3-5.1)  8x8 L3.1 - 5.1

Tool	Baseline	Extended	Main	High	High 10	High 4:2:2	High 4:4:4
Fidelity range:							
chroma format (chroma_format_idc)	0	0	0	0 - 1	0 - 1	0 - 1	0 - 3
bit depth (bit_depth_luma_minus8, bit_depth_chroma_minus8)	0	0	0	0	0 - 2	0 - 2	0 - 4
transform bypass (qpprime_y_zero_transform_bypass_flag)	0	0	0	0	0	0	0 or 1

No = not allowed; n/a = not applicable

### VC-1

This version of SyncCert supports the following elements of the VC-1 standard. See Reference [17] under *Standards References* on page 1-26.

**VC-1 Profiles, Levels.** The following Profiles and Levels are supported (this is all Profiles and all Levels):

Profile	Levels
Simple	Low Medium
Main	Low Medium High
Advanced	L0 L1 L2 L3 L4

### MPEG-4

This version of SyncCert supports the following elements of the MPEG-4 standard. See Reference [1] under *Standards References* on page 1-26.

**NOTE.** *SyncCert's support for MPEG-4 has been updated to the 2004 version of the MPEG-4 standard, which has a number of differences from the previous version.*

**MPEG-4 Profiles, Levels.** The following Profiles and Levels are supported:

Profile	Levels
Simple	Level 0 (see note below) Level 1 Level 2 Level 3

Profile	Levels
Advanced Simple	Level 0 Level 1 Level 2 Level 3 Level 3b (see Reference [6], <i>Standards References</i> on page 1-26) Level 4 Level 5
Main	Level 2

**NOTE.** *Level 0, which is not in the MPEG-4 Standard Reference [1] (see Standards References on page 1-26), is an addition to Simple Profile. Level 0 is targeted at mobile applications: for example, with a maximum picture size of QCIF and maximum frame rate of 15 frames per second.*

**MPEG-4 tools.** See the following standard for a description of the MPEG-4 tools: MPEG-4 Part 2 (Visual), Reference [1] Table 9-1.

For MPEG-4 Simple Profile, Advanced Simple Profile, and Main Profile, the following tools are supported:

Tool	Simple Profile	Advanced Simple Profile	Main Profile
Basic: <ul style="list-style-type: none"> <li>▪ I-VOP</li> <li>▪ P-VOP</li> <li>▪ AC/DC prediction</li> <li>▪ 4 Motion Vectors</li> <li>▪ Unrestricted Motion Vectors</li> </ul>	Y	Y	Y
Short header	Y	Y	Y
Error resilience: <ul style="list-style-type: none"> <li>▪ Slice Resynchronization</li> <li>▪ Data Partitioning</li> <li>▪ Reversible VLC</li> </ul>	Y	Y	Y
B-VOPs		Y	N
Method 1/Method 2 quantization		Y	Y

Tool	Simple Profile	Advanced Simple Profile	Main Profile
Global Motion Compensation: <ul style="list-style-type: none"> <li>▪ Mode 0</li> <li>▪ Mode 1</li> <li>▪ Mode 2</li> <li>▪ Mode 3</li> </ul>		Y	
Quarter Sample Motion Compensation (quarter pel)		Y	
Interlace		Y (L4, 5 only)	N

Means that this tool is not allowed in the profile concerned.

---

**NOTE.** *MPEG-4 Simple Profile Short Header is decoded by SyncCert as H.263 Baseline, as defined by the MPEG-4.*

---

The following tools are not supported for Main Profile:

- P-VOP based temporal scalability:
  - Rectangular
  - Arbitrary shape
- Binary shape
- Gray shape
- Sprite

**MPEG-2**

This version of SyncCert supports the following elements of the MPEG-2 standard. See Reference [14] under *Standards References* on page 1-26.

**MPEG-2 Profiles, Levels.** The following Profiles and Levels are supported, subject to the restrictions given under *Permitted Audio Types/Format* on page 1-24.

Profile	Levels
Main	Main Level High Level High Level 1440
4:2:2	Main Level High Level

**MPEG-2 tools.** For MPEG-2 Main Profile at Main Level, at High Level, and at High Level 1440, the following tools are supported:

Tool	Main Level	High Level	High Level 1440
I-frames	Y	Y	Y
P-frames	Y	Y	Y
B-frames	Y	Y	Y
Field-coded pictures (Interlaced)	Y	Y	Y
Frame-coded pictures: With field or frame order MacroBlocks	Y	Y	Y
Layers: GOP, Picture, Slice, MacroBlock, Block	Y	Y	Y

**NOTE.** *Higher syntactic structures are also supported within SyncCert - PES and VOB - see MPEG-2 Higher Syntactic Structures on page 1-18.*

### **H.263+, H.263**

The following H.263 standards are supported:

- H.263 baseline standard, see reference [2] under *Standards References* on page 1-26.
- H.263+, see reference [2] under *Standards References* on page 1-26, including Annexes:
  - A: Inverse transform accuracy specification
  - B: Hypothetical reference decoder
  - C: Considerations for Multipoint
  - D: Unrestricted Motion Vector mode
  - F: Advanced Prediction mode
  - I: Advanced Intra Coding mode
  - J: Deblocking filter mode
  - K: Slice Structured mode
  - S: Alternative Inter VLC mode
  - T: Modified Quantization mode

No other annexes are supported.



## Supported Audio Compression Standards

SyncCert supports audio extraction and playout. SyncCert also supports audio stream analysis functionality for all supported standards except Dolby Digital (AC-3). Supported standards are:

- MPEG-1 Part 3 audio  
(Reference [23] in *Standards References* on page 1-26)
- MPEG-2 Part 3 audio  
(Reference [19] in *Standards References* on page 1-26)
- MPEG-2 Part 7 AAC  
(Reference [20] in *Standards References* on page 1-26)
- MPEG-4 Part 3 audio  
(Reference [21] in *Standards References* on page 1-26)
- Dolby Digital (AC-3)  
(Reference [25] in *Standards References* on page 1-26)

SyncCert also supports audio files in the following container formats:

- MPEG-4 Part 3 ADTS files  
(Reference [22] in *Standards References* on page 1-26)
- MPEG-4 Parts 1 and 14  
(References [11] and [24] in *Standards References* on page 1-26)
- MPEG-2 Transport, Program, PES streams  
(Reference [15] in *Standards References* on page 1-26)
- 3GPP (Reference [12] in *Standards References* on page 1-26)

### MPEG-1 Part 3 audio

SyncCert supports the MPEG-1 Part 3 audio standard, as defined in Reference [23] in *Standards References* on page 1-26. SyncCert supports the following layers of this standard:

- Layer I
- Layer II

SyncCert supports monophonic and stereophonic streams in this standard.

### **MPEG-2 Part 3 audio**

SyncCert supports the MPEG-2 Part 3 audio standard, as defined in Reference [19], *Standards References* on page 1-26. SyncCert supports the extension of MPEG-1 Part 3 audio to LSF (Low Sampling Frequency) for the following layers:

- Layer I
- Layer II

SyncCert supports monophonic and stereophonic streams in this standard.

### **MPEG-2 Part 7 AAC audio**

SyncCert supports the MPEG-2 Part 7 AAC audio standard, as defined in Reference [20], *Standards References* on page 1-26. SyncCert supports the following profiles:

- Main

SyncCert supports monophonic and stereophonic streams in this standard.

### **MPEG-4 Part 3 audio**

SyncCert supports the MPEG-4 Part 3 audio standard, as defined in Reference [21], *Standards References* on page 1-26. SyncCert supports the following profiles:

- Main
- LC (Low Complexity)
- LTP (Long Term Prediction)
- HE-AAC (High Efficiency, ‘AAC plus’), low complexity profile with SBR (Spectral Band Replication)

SyncCert supports monophonic and stereophonic streams in this standard.

### **MPEG-4 Part 3 ADTS files**

SyncCert supports the Audio Data Transport Stream (ADTS) for AAC audio, as defined in Reference [22], *Standards References* on page 1-26.

## Permitted Video Types/Formats

SyncCert analyzes and displays many file types, such as:

- Video files containing video Elementary Streams
- Container files, such as ASF files, RCV files, MP4/3GPP files, MPEG-2 Transport Streams, and MPEG-2 Program streams, which include video, audio and other data
- Uncompressed video files, such as YUV, RGB or grayscale color models, 8 bit and 16 bit sample depth, and various chroma sub-sampling formats

The primary analysis functions of SyncCert are performed on video Elementary Streams, and features are provided to extract these from within container files such as MP4 and 3GPP files.

### Microsoft ASF Files

ASF files typically contain video, audio and other data. An ASF file can contain more than one video stream. See Reference [18] in *Standards References* on page 1-26.

### RCV Files

RCV files contain video in the VC-1 format. See Reference [17] in *Standards References* on page 1-26.

### MP4 Files

MP4 files typically contain video, audio and other data. An MP4 file can contain more than one video stream; these streams can be located consecutively or split up in many areas of the MP4 file.

The MP4 files that SyncCert analyzes should conform to the relevant part of the MPEG-4 standard. See Reference [11] in *Standards References* on page 1-26.

By default, SyncCert looks for MP4 files with an .mp4 file extension, although any file name can be used. SyncCert will determine that it is an MP4 file by looking through the file contents.

The video streams can be extracted from the MP4 file and analyzed directly, or extracted and analyzed later. For information on opening MP4 files, extracting and saving the video streams (see *Open Stream* in the *How to Use SyncCert* section).

### 3GPP Files

3GPP files are a subset of MPEG-4 files, with an indicator in the file to denote that it is a 3GPP file.

3GPP files should conform to the standard concerned. See Reference [12] in *Standards References* on page 1-26.

By default, SyncCert looks for 3GPP files with a .3gp file extension, although any file name can be used. SyncCert will determine that it is a 3GPP file by looking through the file contents.

The video streams are extracted from 3GPP files and analyzed directly or extracted and analyzed later in the same way as MP4 files. For information on opening 3GPP files and extracting and saving the video streams, see *Open Stream* in the *How to Use SyncCert* section.

### **MPEG-2 Transport Stream Files**

MPEG-2 Transport Streams typically contain video, audio, and other data. An MPEG-2 Transport Stream can contain more than one video stream - in fact hundreds or more. These streams can be located largely consecutively in the Transport Stream packets or split up in many areas of the Transport Stream.

Transport Streams with 188, 196, 204, and 208 bytes per packet can be analyzed.

### **MPEG-2 Higher Syntactic Structures**

**MPEG-2 Program Stream and PES files.** An MPEG-2 Program Stream contains one or more Packetized Elementary Streams (PES), with a common time base. (The Program Stream is designed for use in a relatively error-free environment.)

The format of the Program Stream is defined in Part 1 of the MPEG-2 standard, Reference [15] in *Standards References* on page 1-26.

A Program Stream can contain a complete Elementary Stream, or it can contain only part of an Elementary Stream.

SyncCert will open MPEG-2 Program Stream files (typically with a file extension of .mpg) and display the structure of the Program Stream, such as the PES packets inside.

In accordance with the MPEG-2 standard (see Reference [15] in *Standards References* on page 1-26), the Program Stream file will start with a 32-bit start code: 0x000001ba, 0000 0000 0000 0000 0000 0001 1011 1010.

**MPEG-2 VOB files (DVD).** VOB files are used on a DVD to store the video and audio; a VOB contains a Program Stream.

A single video Elementary Stream (for example, a movie) is usually distributed among a number of VOB files.

**NOTE.** *You can specify the different VOBs that contain a single Elementary Stream, so that SyncCert can extract the Elementary Stream from the different VOBs.*

---

SyncCert will open MPEG-2 VOB files (typically with a file extension of .vob) and display the structure of the Program Stream, such as the PES packets inside.

See Reference [16] in *Standards References* on page 1-26.

**NOTE.** *When opening a VOB, there is no requirement that the VOB begins with an I-frame. In this situation, the video will not display correctly until an I-frame is reached.*

*Encrypted (scrambled) VOBs cannot be opened.*

---

### **Uncompressed Video File Format**

The general uncompressed video file format is as follows:

- No headers of any kind (no file or frame headers)
- Concatenated planar image data
- Row raster order (top picture row first)
- Unsigned samples

For 8-bit sample depth:

- One byte per sample

For 9 to 16 bit sample depth:

- Two bytes per sample
- Little- and big-endian byte orders supported

For YUV format:

- Concatenated Y, U, and V planes
- U and V planes sub-sampled as required
- Y plane samples are unsigned
- U and V plane samples are unsigned with a DC offset of  $2^{n-1}$ , where  $n$  is the chroma sample bit depth

For RGB format:

- Concatenated R, G, and B planes

For grayscale format:

- Luma plane only

### Compressed Video File Format

The formats of the raw compressed video data files (for example, called Elementary Streams, typically with a file extension of .m4v or .cmp in MPEG-4) that SyncCert analyzes are defined in the relevant standards. Proprietary file formats are not supported.

---

**NOTE.** *A compressed video file to be analyzed should not be an AVI file (which puts a wrapper around the encoded video and audio).*

*The compressed video elementary stream file cannot contain audio, although the original container file (such as MP4 or 3GPP) may have contained audio.*

---

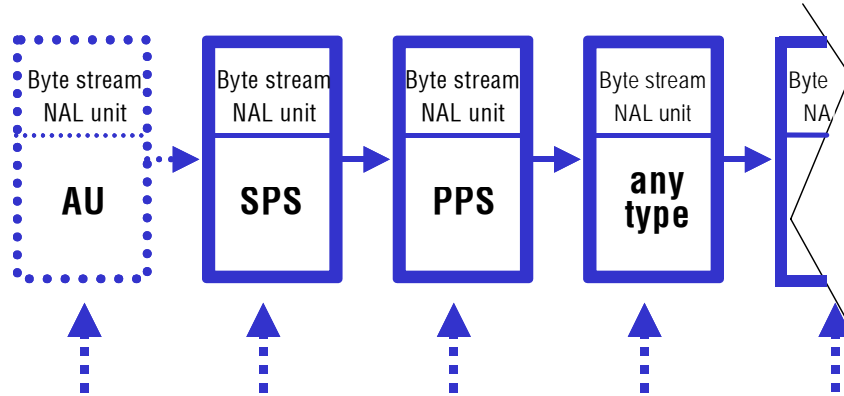
Once the video is extracted, SyncCert will automatically determine the format of the compressed video in the file by searching through the video and looking for the appropriate start codes. Accordingly, the file name does require a particular file extension to be decoded correctly.

**H.264/AVC Byte Stream file format.** In accordance with the H.264/AVC standard (see Reference [13] in *Standards References* on page 1-26), the video file must start as given in the following diagram.

The abbreviations mean:

AU	access_unit_delimiter_rbsp_nal_unit
SPS	sequence_parameter_set_nal_unit
PPS	picture_parameter_set_nal_unit

**Start of Bitstream**



Zero or more byte stream NAL units of type Filler and/or Reserved may be inserted at these points.

For example, if the bitstream does not contain the optional items at the start then the first six bytes in an Extended profile byte stream file will be: 00 00 00 01 67 58 (all values in hexadecimal)

**VC-1 Advanced Profile and Elementary Stream file format.** Within the VC-1 standard (see Reference [18] in *Standards References* on page 1-26), only the Advanced Profile can exist as a separate Elementary Stream. The Simple and Main Profiles are required to be part of a container file (such as RCV, ASF or MPEG-2 TS), so that the required header information is stored.

SyncCert fully supports the VC-1 implementations of the Simple, Main and Advanced Profiles in each standard.

(See the standards in Reference [17] in *Standards References* on page 1-26 for details of the start codes and syntax permissible for each of these.)

**MPEG-4 Elementary Stream file format.** In accordance with the MPEG-4 standard (see Reference [1] in *Standards References* on page 1-26), the file will start with a valid header start code that contains configuration information such as:

```

visual_object_sequence_start_code (0xB0)
or visual_object_start_code (0xB5)
or video_object_layer_start_code (0x20 - 0x2F)
or video_object_start_code (0x00 - 0x1F)
    
```

For MPEG-4 Short Header video, there is no header code other than the 22-bit start code:

- video\_plane\_with\_short\_header ( ) (see below)

The start codes actually used will vary from one stream to another.

These start codes (except Short Header) may be followed by further configuration data until the start code for the video data is reached, which must start with one of the following functions:

- `Group_of_VideoObjectPlane()` start code: 0xB3
- `VideoObjectPlane()` start code: 0xB6

See the MPEG-4 standard Reference [1] (in section 6.1.2) in *Standards References* on page 1-26 for more information.

Note that the entry points `MeshObject()` and `mba_object()` also given in section 6.1.2 of the MPEG-4 standard are not supported. These are non-allowable tools in the Profiles and Levels supported by SyncCert.

This means that for

- `Group_of_VideoObjectPlane()`
- `VideoObjectPlane()`

the 24 bits in the video file before the start code must be the Start Code Prefix: 0000 0000 0000 0000 0000 0001. This is then followed by the 8-bit start code value.

However, for

- `video_plane_with_short_header()`

the first 22 bits in the video stream are the same as for H.263+ and H.263 (see below).

**MPEG-2 Elementary Stream file format.** In accordance with the MPEG-2 standard (see Reference [15] in *Standards References* on page 1-26), the Elementary Stream file will start with a 32-bit start code:

Hex: 0x000001b3; Bin: 0000 0000 0000 0000 0000 0001 1011 0011.

**H.263+, H.263 file format.** The first bits in an H.263+/H.263 compressed file should be the 22-bit PSC (Picture Start Code): 0000 0000 0000 0000 1000 00.

### Source Video Format

The above means that when the video was encoded, the uncompressed source format of the video file to be encoded should have been YUV 4:2:0 with 4 bytes of Y data (luminance) for every 1 byte of U and 1 byte of V data (color differences). (The color difference data is sub-sampled by 2 in horizontal and vertical directions.)



For H.264/AVC High Profiles, the following alternative image formats are also supported:

- YUV, RGB or grayscale color models
- Alternative YUV chroma sub-sampling: 4:2:0, 4:2:2, or 4:4:4
- Alternative image sample bit depths: from 8 to 12 bits

It is up to the encoder to take the input data and order it correctly, so the pixel data must appear with the top left pixel first, followed by the pixel to the right in the compressed bitstream. If the video data stream input to the encoder does not follow this order, then it is up to the encoder to rearrange the data order.

### **Video Image Size**

The maximum size of the video images that can be analyzed within SyncCert is effectively up to 16384 x 16384 pixels.

For each standard, there is a maximum size. SyncCert will analyze video to the maximum size allowed in the video standard concerned within this limit. For example:

- 4096 pixels wide x 2304 pixels high in H.264/AVC
- 1920 pixels wide x 1088 pixels high in MPEG-2 Main Profile @ High Level

There is no minimum size.

### **Video File Size**

The maximum video file size that can be analyzed is effectively limited only by the disk space on your computer. The limit to the size is actually 1 million Terabytes [ $2^{60}$ ] or 1 billion Gigabytes.

SyncCert will open the first part of the video file and start playing and analyzing this immediately if possible. In some cases, SyncCert must search through a certain amount of the file before there is sufficient data for display.

In addition, the results from analysis of the input video file are cached in SyncCert memory in the Step-back buffer. If the results for the section of video to be displayed/analyzed are not in the cache, then this is indicated on-screen and SyncCert will pause while loading the relevant data in the cache.

### **PAL/NTSC**

Both PAL and NTSC format video can be analyzed with SyncCert.

## Permitted Audio Types/Format

Audio is supported under the following container formats, as described in the previous section:

- MPEG-4 Part 3 ADTS files
- MPEG-2 Transport Stream, Program Stream, Packetized Elementary Stream (PES)
- 3GPP
- MP4

### MPEG-2 Transport Stream files

MPEG-2 Transport Streams typically contain video, audio and other data. An MPEG-2 Transport Stream can contain more than one media stream - in fact hundreds or more; these streams can be located largely consecutively in the Transport Stream packets or split up in many areas of the Transport Stream.

Transport Streams with 188, 196, 204, and 208 bytes per packet can be analyzed.

### MPEG-2 Program Stream and PES files

An MPEG-2 Program Stream contains one or more Packetised Elementary Streams (PES), with a common time base. (The Program Stream is designed for use in a relatively error-free environment.)

The format of the Program Stream is defined in Part 1 of the MPEG-2 standard. See Reference [15] in *Standards References* on page 1-26.

A Program Stream can contain a complete Elementary Stream, or it can contain only part of an Elementary Stream.

SyncCert will open MPEG-2 Program Stream files (typically with a file extension of .mpg) and display the structure of the Program Stream, such as the PES packets inside.

In accordance with the MPEG-2 standard (see Reference [15] in *Standards References* on page 1-26), the Program Stream file will start with a 32-bit start code: 0x000001BA, for example, 0000 0000 0000 0000 0000 0001 1011 1010

### 3GPP files

3GPP files are a subset of MPEG-4 files, with an indicator in each 3GPP file to denote that it is a 3GPP file.

3GPP files should conform to the standard concerned. See Reference [12] in *Standards References* on page 1-26.

By default, SyncCert looks for 3GPP files with a .3gp file extension, although any file name can be used; SyncCert will determine that it is a 3GPP file by looking through the file contents.

The audio streams are extracted from 3GPP files and analyzed directly or extracted and analyzed later in the same way as for MP4 files. For information on opening 3GPP files, extracting and saving the audio streams, see the *How to Use SyncCert* section.

### **MP4 files**

MP4 files typically contain video, audio and other data. An MP4 file can contain more than one video stream. These streams can be located consecutively or split up in many areas of the MP4 file.

The MP4 files that SyncCert analyzes should conform to the relevant part of the MPEG-4 standard. See Reference [11] in *Standards References* on page 1-26.

By default, SyncCert looks for MP4 files with an .mp4 file extension, although any file name can be used; SyncCert will determine that it is an MP4 file by looking through the file contents.

The audio streams can be extracted from the MP4 file and analyzed directly, or extracted and analyzed later. For information on opening MP4 files and extracting and saving the audio streams, see the *How to Use SyncCert* section.

## Standards References

- [1] MPEG-4 Part 2 (Visual): standard number ISO/IEC 14496-2:2004; ISO title: Information technology - Coding of audio-visual objects: Part 2: Visual, 3rd Edition 2004-06-01; plus 14496-2:2004 Technical Corrigendum 1 Published 2004-06-15
- [2] H.263: Video Coding for Low Bit Rate Communication. International Telecommunication Union (ITU) 1998
- [3] H.261: Video Codec for AudioVisual Services at px64 kbit/s. International Telecommunication Union (ITU) 1994
- [4] MPEG-4 Video Verification Model version 18.0: document reference number ISO/IEC JTC1/SC29/WG11 N3908 dated January 2001
- [5] MPEG-4 Part 2 (Visual) ISO/IEC 14496-2 Amendment 2, 2002-02-01: Streaming video profile (contains Advanced Simple Profile)
- [6] MPEG-4 Part 2 (Visual) ISO/IEC 14496-2:2001 Final Draft Amendment 3 FDAM 3:2003(E): New levels and tools for MPEG-4 visual (contains Advanced Simple Profile Level 3b)
- [7] MPEG-4 Part 2 (Visual) ISO/IEC 14496-2 Microsoft reference software: FDAM1-2.3-001213 version 2 dated July 3rd 2000
- [8] MPEG-4 Part 4 (Conformance Testing) ISO/IEC Study of CD 14496-4 N3067 1999-03-18, Visual clause w3067\_4(v)
- [9] MPEG-4 Part 4 (Conformance Testing) ISO/IEC 14496-4 MPEG-4 Normative ISO bitstreams dated 05/11/2001, specified in sections 4.5.3.1 and 4.5.7 of Reference [8]
- [10] MPEG-4 Part 4 (Conformance Testing) ISO/IEC 14496-4 MPEG-4 Donated bitstreams dated 14/07/2000, referred to in section 4.5.8 of Reference [8]
- [11] MPEG-4 Part 1 (Systems) ISO/IEC 14496-1: Information technology - Coding of audio-visual objects: Part 1: Systems, 3rd Edition dated March 2002
- [12] 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Transparent end-to-end Packet-switched Streaming Service (PSS); Protocols and codecs (Release 5); reference 3GPP TS 26.234 V5.5.0 (2003-06)

- [13] H.264/AVC Standard ISO/IEC 14496-10 (First Edition 2003-12-01): Information technology - Coding of audio-visual objects - Part 10: Advanced video coding with document JVT-K051 "Version 3 of H.264/AVC" dated 9 June 2004 (errata and Fidelity Range Extensions) and document JVT-L047d8 "Draft Text of H.264/AVC Fidelity Range Extensions Amendment" (AVC Amendment 1 Fidelity Range Extensions, Draft) dated 28 August 2004
- [14] MPEG-2 Part 2 (Visual): ISO/IEC 13818-2 Second edition 2000-12-15 (2000 E): Information technology - Generic coding of moving pictures and associated audio information: Video with Amendment 1: Content description data (2001-12-15, corrected version 2002-08-01) and Technical Corrigendum 1 (published 2002-03-01)
- [15] MPEG-2 Part 1 (Systems): ISO/IEC 13818-1 Second edition 2000-12-01 (2000 E): Information technology - Generic coding of moving pictures and associated audio information: Systems with Amendment 1: Carriage of metadata over ITU-T Rec. H.222.0 | ISO/IEC 13818-1 streams (2003-08-01, corrected version 2003-10-15) and Technical Corrigendum 1 (published 2002-03-01) and Technical Corrigendum 2 (published 2002-12-01) and Amendment 3 Transport of AVC video data over ITU-T Rec. H222.0/ ISO/IEC 13818-1 streams, dated 2004-11-01
- [16] DVD Standard for Video: DVD-Video Book Part 3: Video Specifications v1.1
- [17] SMPTE "Proposed SMPTE Standard for Television: VC-1 Compressed Video Bitstream Format and Decoding Process" committee draft 2, revision 1, reference number SMPTE CD xxxM (also referred to as VC-1)
- [18] Advanced Systems Format (ASF) Specification: revision 01.20.02; Microsoft Corporation, June 2004
- [19] MPEG-2 audio: ISO/IEC 13818-3:1998 Information technology, Generic coding of moving pictures and associated audio information, Part 3: Audio
- [20] MPEG-2 AAC: ISO/IEC 13818-7:2004 Information technology, Generic coding of moving pictures and associated audio information, Part 7: Advanced Audio Coding (AAC)
- [21] MPEG-4 AAC (AAC plus): ISO/IEC 14496-3:2001 Information technology, Coding of audio-visual objects, Part 3: Audio plus Cor1:2002, Cor1:2004, Cor2:2004, Amd1:2003, Amd2:2004, Amd3
- [22] HE AAC codecs: ISO/IEC 14496-3:2001 Information technology, Coding of audio-visual objects, Part 3: Audio plus Cor1:2002, Cor1:2004, Cor2:2004, Amd1:2003, Amd2:2004, Amd3

- [23] MPEG-1 audio: ISO/IEC 11172-3:1993 Information technology, Coding of moving pictures and associated audio for digital storage media at up to about 1.5Mbit/s, Part3: Audio
- [24] MPEG-4 Part 14: ISO/IEC 14496-14:2003 Information technology, Coding of audio-visual objects, Part 14: MP4 file format
- [25] Digital Audio Compression Standard (AC-3) ATSC A/52, (1995-12)



# How to Use SyncCert





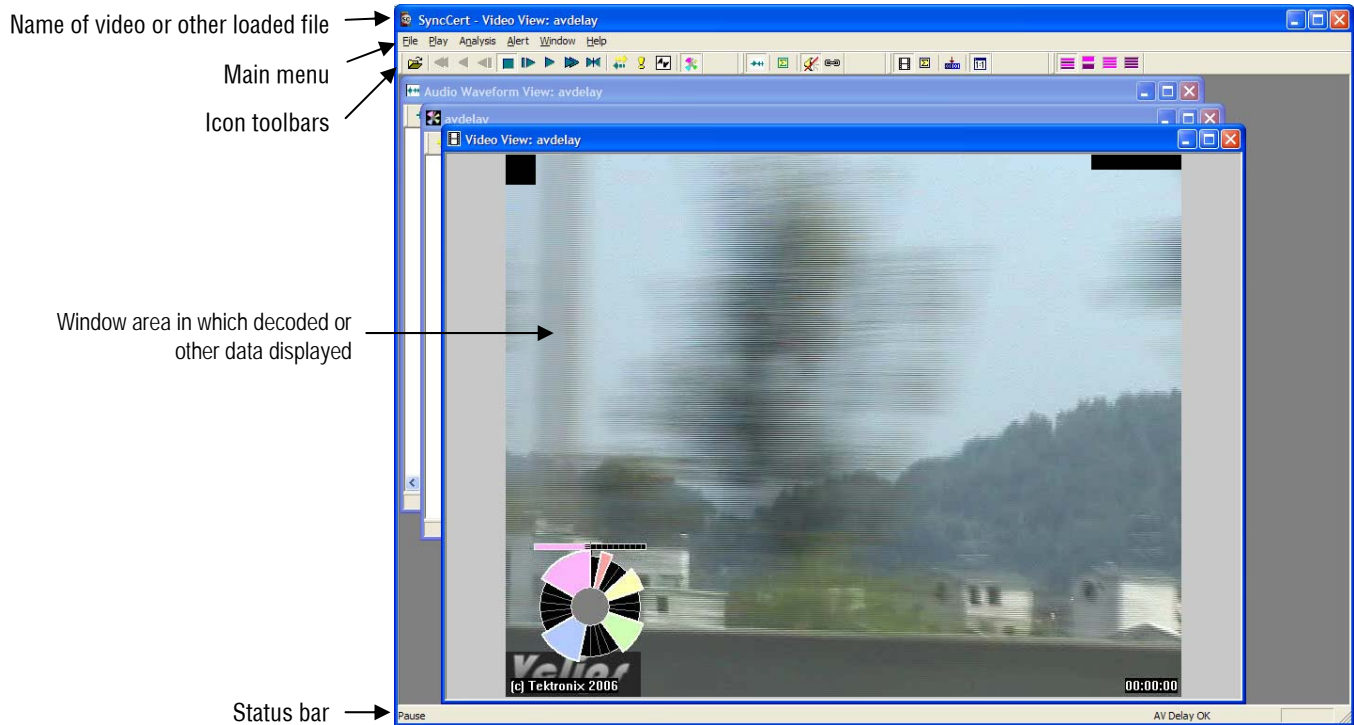
# How to Use SyncCert

SyncCert provides a complete solution for measuring audio/video synchronization delay in an encoding system. SyncCert provides a selection of predefined, clock-tick test streams in various formats. You can select an audio and a video stream and encode them using your own equipment. You can then analyze the resulting encoded stream using SyncCert and measure any time delay between the audio and video that may have been introduced by the encoding.

The available test streams include uncompressed streams for testing elementary stream encoders and compressed streams for testing transport multiplexers.

(See also *Export A/V Delay Streams...*, page 2-30.)

## Window Elements



---

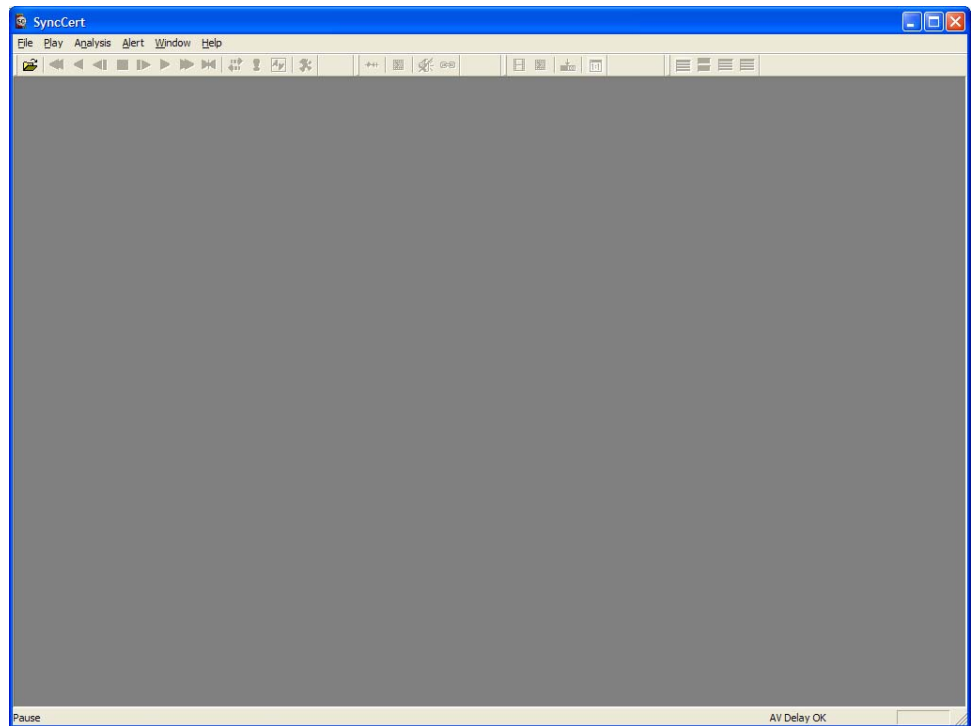
**NOTE.** *The above screenshot was taken with SyncCert running under Windows XP. When SyncCert is running under Windows 2000, there may be some visual differences in the borders, menus, and the way that popup menus appear from those shown in the screenshots. However, there are no functional differences in the way SyncCert operates on these different versions of Windows. (The desktop theme in use will also affect the look.)*

*In addition to the above toolbars/windows, there are multiple other toolbars that are visible when particular functions are enabled. Also, there are some toolbars, tooltips and menu items that are context-sensitive, depending on the video/audio standard being used and/or the explicit function being performed.*

---

## Starting to Use SyncCert

When SyncCert starts, the display initially looks as below:



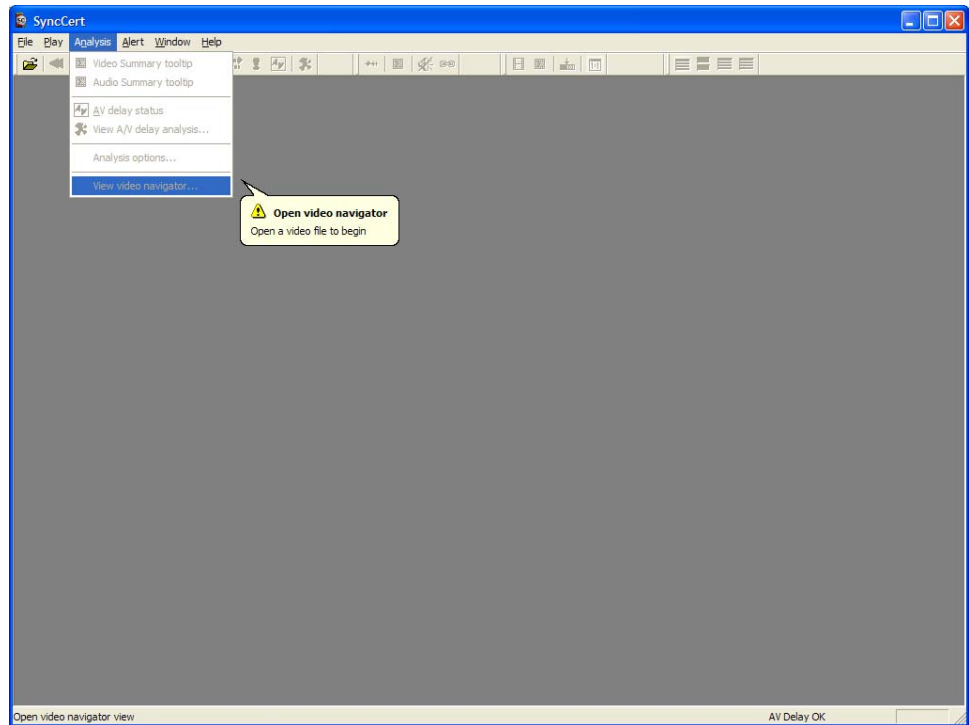
The gray background in the window indicates that no video or other files are loaded.

---

**NOTE.** *Some features on some menus may stay permanently grayed out (unavailable).*


---

When menu items are grayed out, leaving the mouse at the location of the grayed out menu item for a few seconds will display some popup text explaining why the menu item is disabled and/or how it can be enabled. The example is on the Analysis menu, for the View video navigator menu:



### Opening a File

To open a file, do one of the following:


- Click on File > Open stream...
- Click the Open file icon 
- Press Ctrl+O
- Drag and drop the file onto the main SyncCert window

When a stream is loaded, the first frame is decoded and displayed by SyncCert.

By default, three views are displayed: Video, Audio Waveform, and AVDelay. An overview of each is given in the following paragraphs:


### Video View

The Video view displays the video content of the opened file, and the video toolbar is also displayed.

(The Video view can be shown/hidden by selecting the video view icon in the video toolbar  .)


### Audio Waveform View

The Audio Waveform view displays the audio content of the opened file, and the audio toolbar is also displayed (see also page 2-8).

(The Audio Waveform view can be shown/hidden by selecting the audio view icon in the audio toolbar )

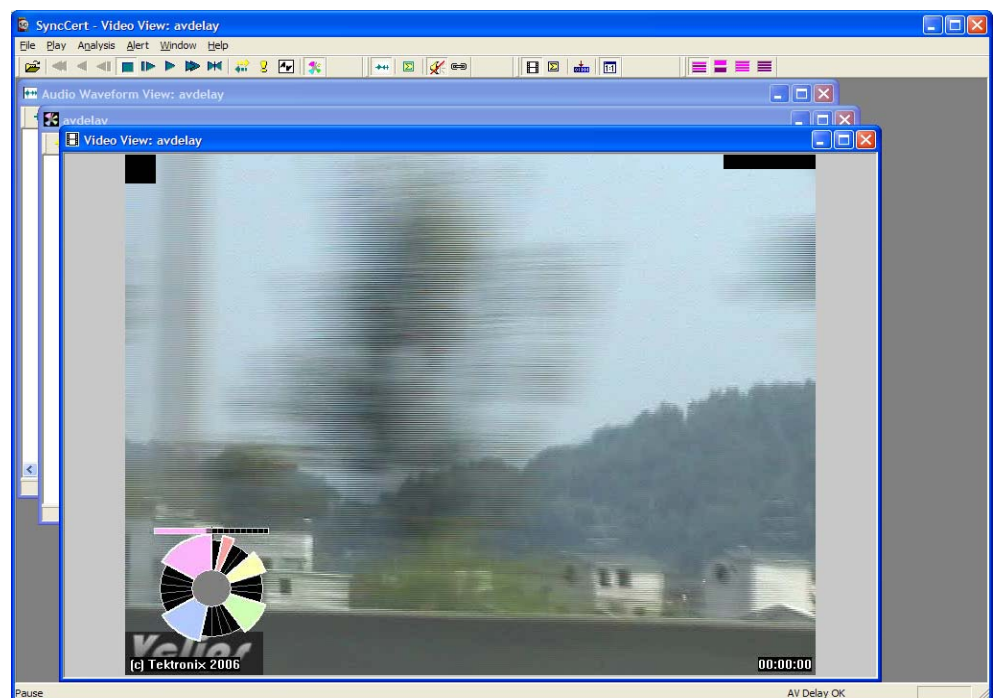
### A/V Delay View

The A/V Delay view displays the A/V delay in graph form of the opened file.

(The A/V Delay view can be shown/hidden by selecting the A/V Delay view icon in the main toolbar )

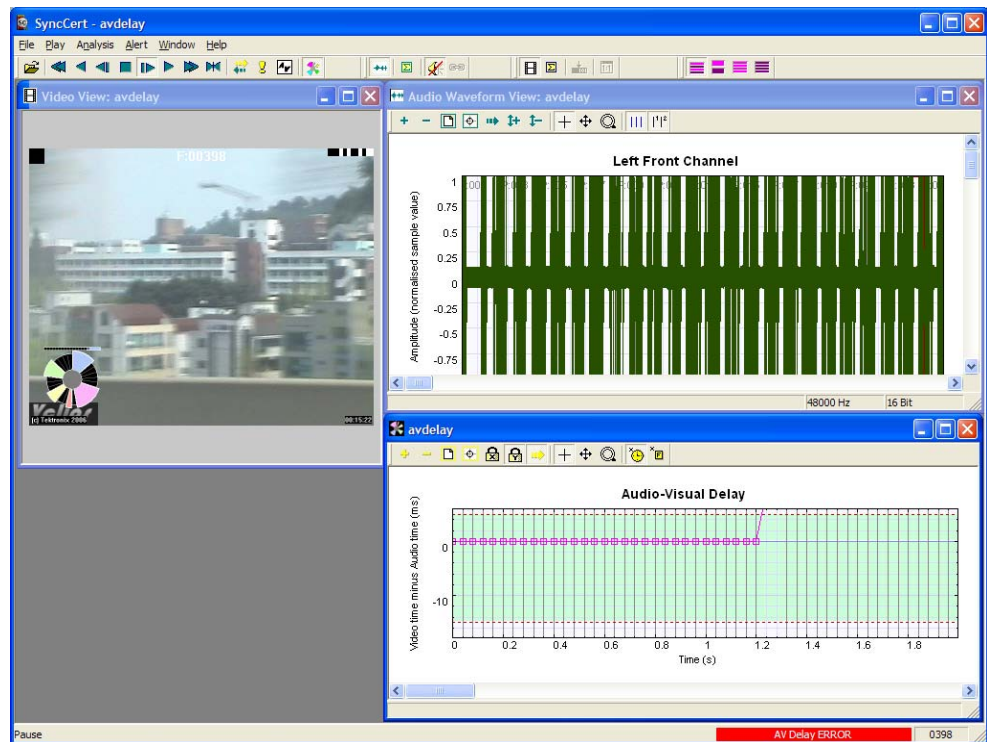
### Open File Example

In the next screenshot, the example file Delay is loaded with its first frame displayed, but the stream is yet to be played, as indicated by the Stop icon and the empty frame counter in the bottom right corner of the screen. The audio waveform view is also displayed.



Frame counter 

If the loaded stream is initially advanced by one frame, the first frame is again decoded/played before entering the Pause mode. In this mode, Analysis options are not available. When stopped, the first frame reappears on the display until the stream is advanced/played further.



As is normal with Windows applications, the window can be dragged around within the frame of the application, resized, maximized, and minimized.

If another file is opened, it replaces the file last opened; another window is not opened.

---

**NOTE.** *You can open a number of copies of SyncCert to allow direct, side-by-side comparisons of multiple streams.*

---

### Playing Mode: Restrictions

There are two Play modes: these are indicated at the lower left corner of the status bar:

- **Stop:** stream is stopped
- **Play:** stream is paused (after Pause/Step forward), or playing at normal speed, or Fast forward.

**NOTE.** See also Audio/Video Synchronization on page 2-34 for further information and details on playing audio and audio-video synchronization.



---

### **Synchronized Views/Navigating the Views**

The following views are available:

- Alert log
- Video view
- Audio view
- A/V delay view
- Video navigator

Some of these views are linked. A right-click in one view will open a context menu with a Goto command that will take you to the corresponding location in another available view.

**Synchronization of views/Synchronize views icon .** When the Synchronize views icon  is pushed in, then all open windows automatically follow the selection that you made.

For example, if the Video Navigator is open at the same time as the Audio waveform view, and the Synchronize views icon is pushed in, and video is then played, all views display the same relative points in the stream at the same time.

**NOTE.** This can cause a delay when the memory buffers used by SyncCert do not contain all the required data, and more time is taken to decode and interpret the video and refill the buffers.

---

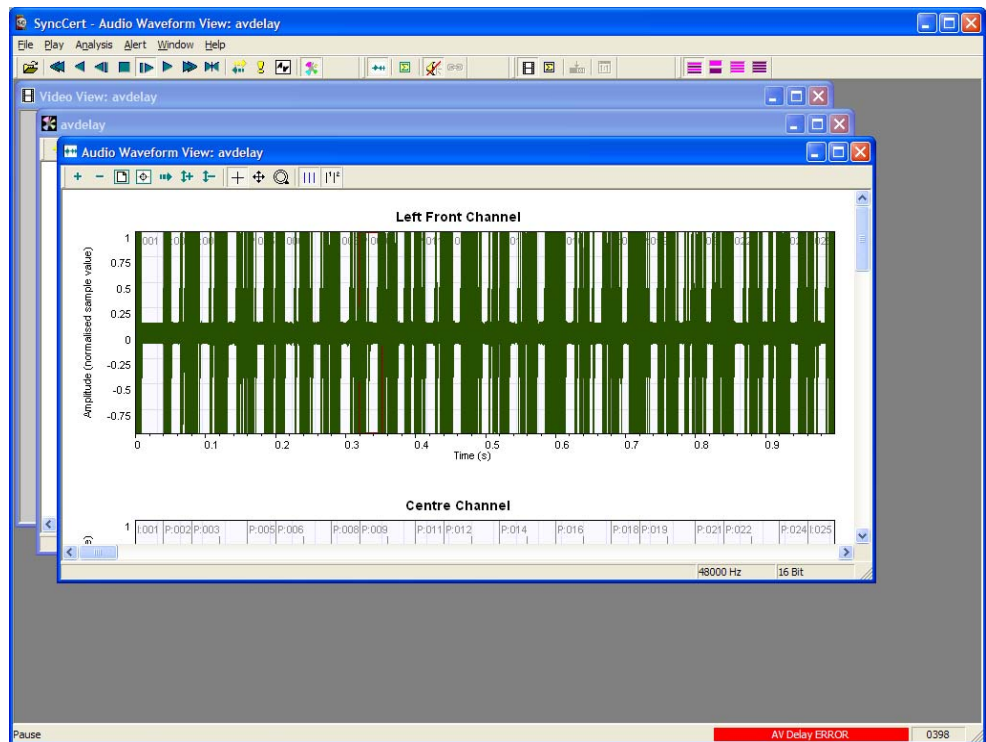
### **Opening Multiple Windows**

Within SyncCert, all views can be opened simultaneously.

## Audio waveform View

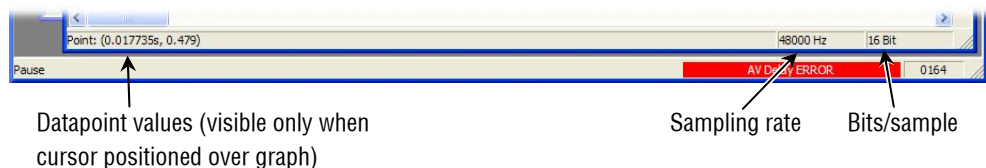
SyncCert offers the ability to view an audio streams waveform: the y-axis is normalized amplitude, and the x-axis is time (seconds).

The audio streams waveform can be viewed while the stream is playing, showing the frames being marked off on vertical bars as the stream is decoded as shown next:



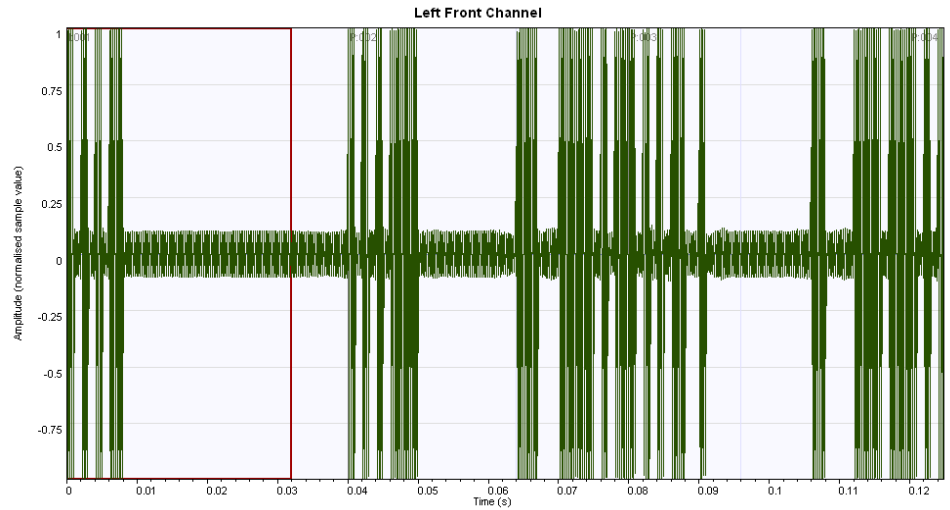
It can also be viewed when the stream has been played through to its end:

Additional information can be found in the Audio waveform views status bar:

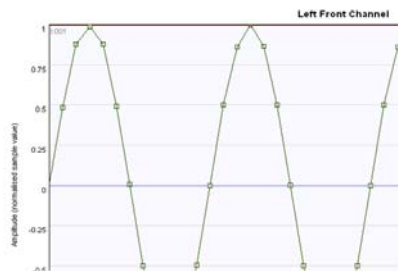
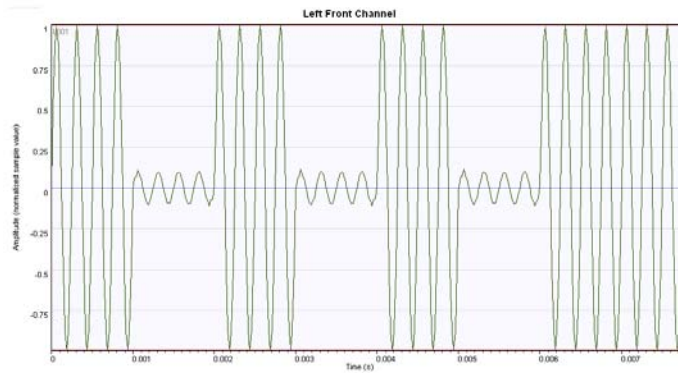




It is possible to zoom in and out on this graph view using the first two icons on the waveform view toolbar, as shown next.















The next two waveforms show that it is possible to zoom in to see the individual data points plotted in the audio waveform.



The functions of the other icons are described in *Audio Waveform Toolbar icons* on page 2-10 (this page).

The Audio Waveform view will display all audio channels.

### Audio Waveform Toolbar icons

Icon	Function
	Zoom in (+) and zoom out (-) centered on the window (affects scale of x-axis only).
	Fit all data into window.
	Locate origin (zero), for example, start of sequence.
	Autoscroll, for example, fill the analysis data in real-time as the audio is decoded, and scroll the window to the right.
	Increase channel height (affects scale of y-axis only).
	Decrease channel height (affects scale of y-axis only).
	Measure the data at the cursor. Values are reported in status bar. Hold and drag to measure offsets and angles/slopes of lines.
	Scroll/pan (the cursor changes to show the scroll/pan direction).
	Zoom in/out centered on the cursor. Press <Shift> to zoom out.
	Show or hide audio frame markers.
	Show or hide the audio waveform.
	Show or hide the audio/video synchronisation markers.

## Main Menu

The submenu options available under each main menu selection (for example, File, Play, Overlay) are described in detail in their respective sections. A summary of each main menu item is given here.

Several of the common functions can be accessed through:

- The icon toolbars (see *Icon Toolbars* on page 2-76)
- Ctrl key combinations (see *Ctrl Shortcut Keys* on page 2-79)

---

**NOTE.** *You can open a number of copies of SyncCert to allow direct, side-by-side comparisons of multiple video streams.*

---

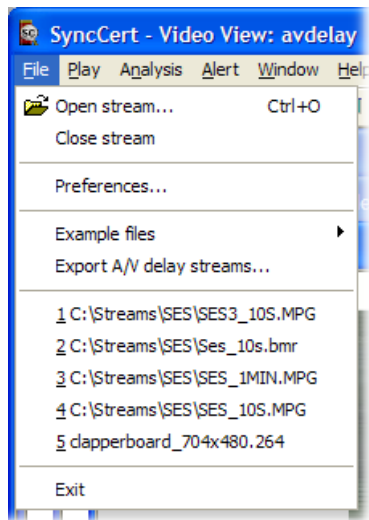
### Functions of each Main Menu Item

Main menu item	Principal functions/sub-options
File	Opening and saving files, recent file list, example files, and exit
Play	Play video and audio, stop, pause, fast forward, and set decoder options
Analysis	Video and audio analysis options
Alert	Enable/disable/configure overall alert levels and individual alerts
Window	Arrange windows and toolbars, view settings, synchronize views, and window list
Help	PDF help and tutorials, license manager, and version info



# File Menu

The following paragraphs describe the options available in the File menu.



## Open Stream... Ctrl+O

With this option, you can browse the file system to find a file to analyze. This file can be:

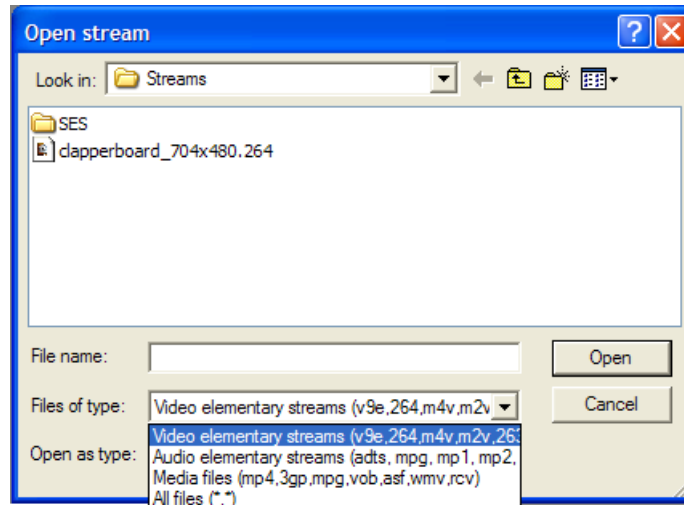
- A file containing only audio, for example, an MPG file
- A compressed video file that contains video data only, for example, an MPEG-4 video Elementary Stream (see *Compression Standards and File Types*).
- A container file that includes audio and transport information as well as video, for example MP4, 3GPP and MPEG-2 (see *Compression Standards and File Types*).
- An uncompressed video file, see *Opening an Uncompressed Video File (any file extension)* on page 2-23.

Note that you can select many files, which allows you to select separate video and audio files and have them open as if they were in a single container.

## Autodetect File Type

When Autodetect is selected in the Open as type drop-down box, the file contents are automatically selected by SyncCert.

In this case, the Files of type drop-down is simply used to narrow the list of file extensions searched for.




The default file extensions that SyncCert looks for are:

- For video-only files: .v9e, .264, .m4v, .m2v, .263, .261, .cmp, .bits
- For audio-only files: .adts, .mpg, .mp1, mp2, aac, ac3
- For container or media files including video: .mp4, .3gp, .mpg, .vob, .asf, .wmv, .rcv

With Autodetect selected, whichever of the file types/extensions is selected, SyncCert will automatically override the selection and determine the standard that the file is compressed to.

---

**NOTE.** *The exceptions to this autodetection are VOB files, where SyncCert will take different actions due to the VOB extension (see Open Stream...  Ctrl+0 on page 2-13).*

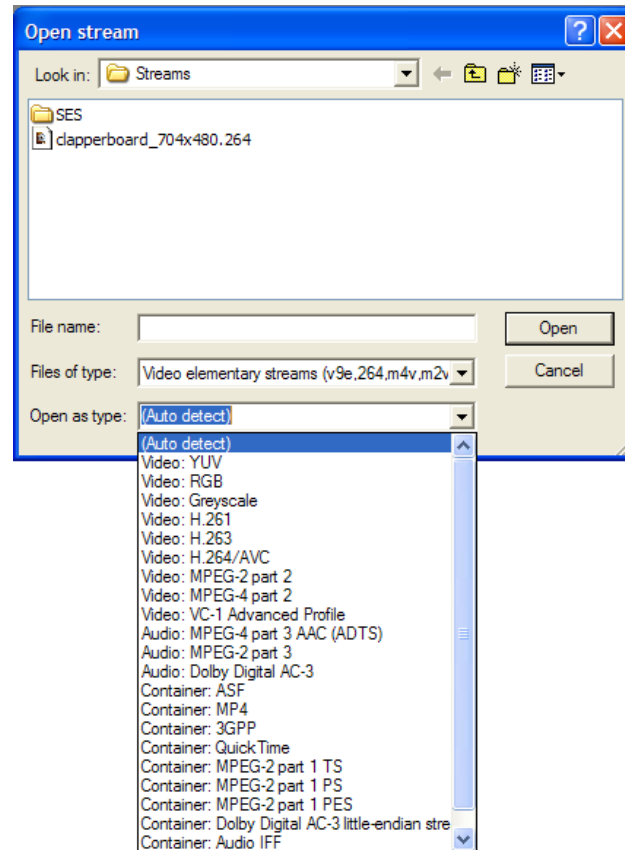
---

The selected file extension is remembered by SyncCert for the next time a file is opened.

### Force to Open as a Specific File Type

Sometimes, particularly if there are errors in a file, the autodetect function of SyncCert does not correctly identify the type of data contained in the file.

If this happens, the file type can be forced by selecting a file type from the drop-down Open as type list. In this case, the file extension is ignored.





---

**NOTE.** To open an uncompressed video file, select the appropriate item from the list, and the SyncCert will open the file in the appropriate format, regardless of the file extension or the data found in the file.

---

### **Opening a Video/Audio Elementary Stream**

When a raw video/audio elementary stream file is opened, SyncCert performs initial checks on the file for validity and to determine the compression standard.

When the file has been read in correctly, the appearance of the Play icon on the toolbar changes from grayed out  to blue , to indicate that the file is ready to play.

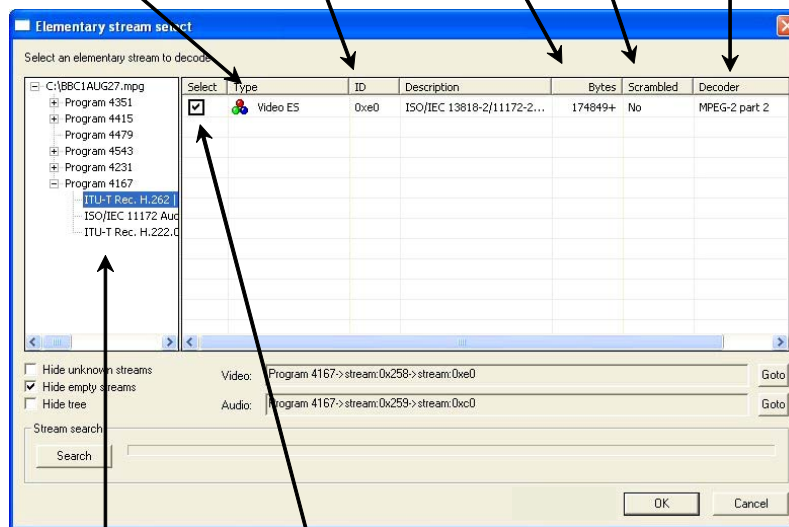
If SyncCert recognizes that the open file does not include video and audio streams, a warning message will be displayed.

The title of the elementary stream is displayed in the title bar of the video and audio window.



### Opening a Container File

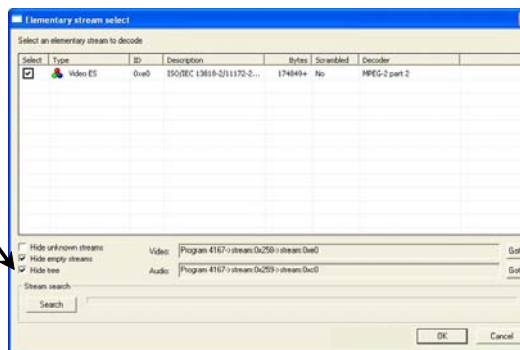
Track type (video, audio, other – note the icon)      Track/stream ID number      Size of track/stream      Scrambled (encrypted)      Decoder type (see below)



Tree structure showing the various programs in the file (click the + and – to open and close the items)

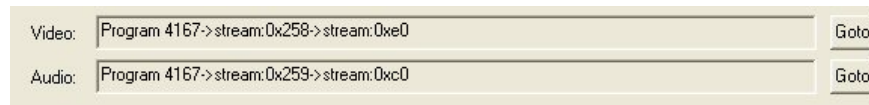
Streams selected for analysis – enter check mark in Select column

Check box below to hide tree structure



When a container file is loaded, SyncCert automatically opens the Elementary stream select window (as shown above), in which are listed all streams, audio and video. The streams contained can be browsed, individually selected for analysis, with your choice of decoder, and either immediately played and analyzed within SyncCert, or extracted and saved to a file before going on to play/analyze them.

**Select.** To select the stream for audio or video analysis, enter a check mark in this column beside the desired stream. A description appears in the Video or Audio fields under the browsing area (as shown in the next screenshot). Only one video and one audio stream can be selected. If a stream is selected and a check mark is subsequently entered beside another stream of the same type, the description will change to show the updated selection.



Clicking on Goto will move the view in the browser window to the location in the tree structure containing that stream, where it can be deselected or the Decoder can be chosen from the drop-down menu (see below).

**Type.** This is the media stream type as identified by the container signaling information. If insufficient signaling information is present, this may show a general type such as Video ES (Elementary Stream), Audio ES or, where the type is unknown, no text at all.

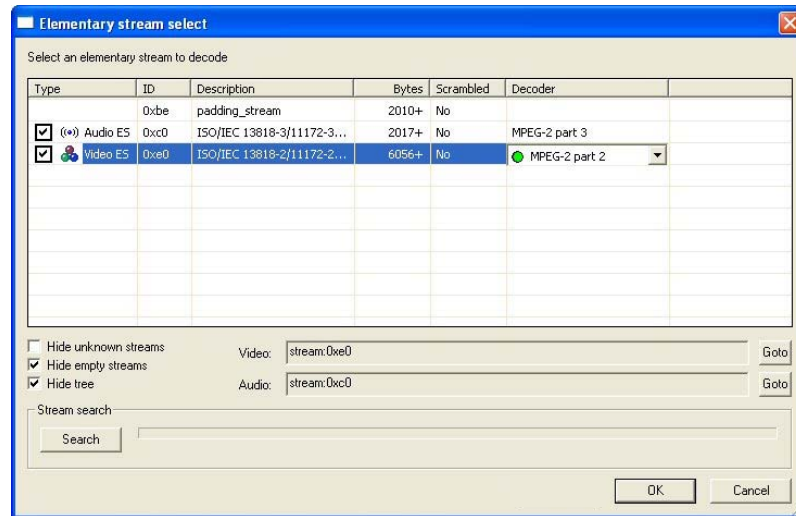
**ID.** This is the media-stream identifier as dictated by the container signaling information, using appropriate notation for the container standard.

**Description.** This is a description of the media stream as dictated by the container signaling information, incorporating text from the relevant standard.

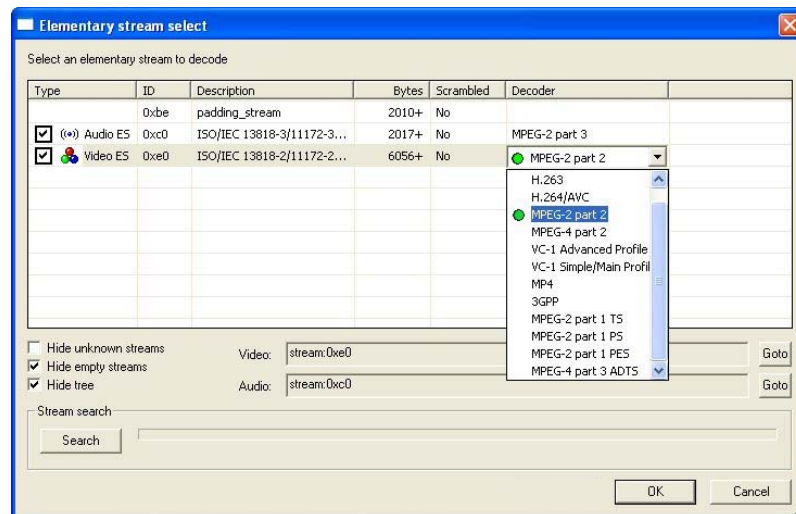
**Bytes.** This is the number of bytes that will be extracted for the stream. If the value is suffixed by a + sign, the total stream size is not known; without the + sign, this value is the final total.

**Scrambled.** This column shows Yes if the stream is scrambled or encrypted in some way. Scrambled streams cannot be decoded.

**Decoder.** Once a stream is selected, the decoder must be chosen. The Decoder column shows the decoder(s) found for the selected stream. There can be multiple streams containing video or audio, each with different decoders. If the Decoder column is empty, then SyncCert has been unable to match one of its decoders with the data it found.



Clicking on the drop-down arrow shows a list of all the available decoders, with the decoder that has been autodetected shown by a green circle:

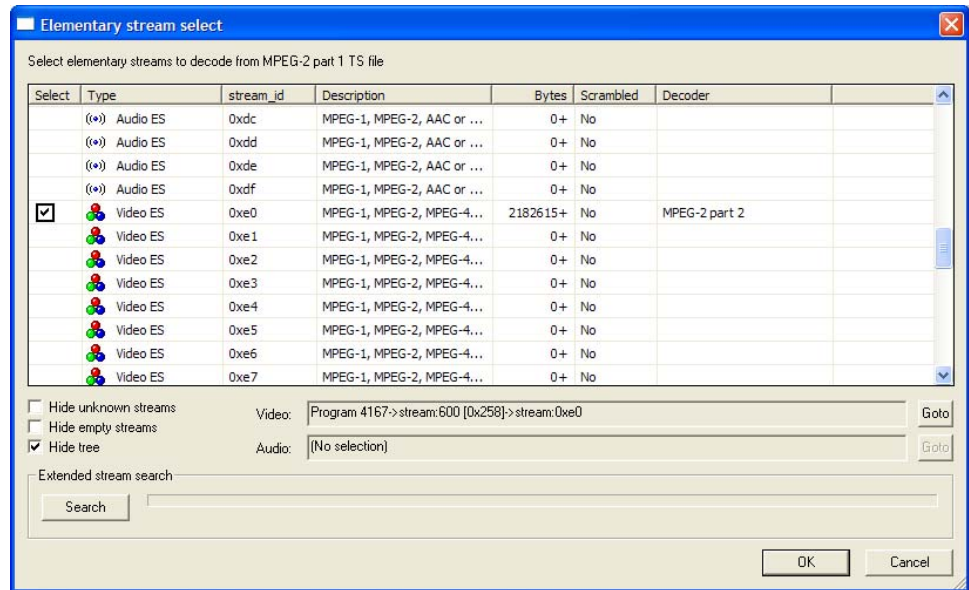


Selecting a different decoder forces SyncCert to use that decoder for this track/Elementary Stream.

**Hide unknown streams.** When selected, Hide unknown streams means that the streams are not shown for which SyncCert has been unable to match one of its decoders.

When Hide unknown streams is enabled, the empty streams are also hidden, because they will not contain valid data for which SyncCert can select a decoder.

**Hide empty streams.** By default, this is enabled. When enabled, this hides streams that appear to be 0 bytes in size. Note that these can still be searched to see if they are in fact larger - see below, under Search.



**Search (Extended stream search).** For some standards, the total size of the stream is indicated in the container file - for example, MPEG-4. In this case, the size of the elementary stream is shown.

However, for some container formats, the size of the elementary streams is not indicated in the container file, and the only way to know the total size is by searching the entire file. (An example of this is MPEG-2 VOBs.)

For these types of files, SyncCert reads the first part of the file only, until an SyncCert decoder can be matched with the data found.

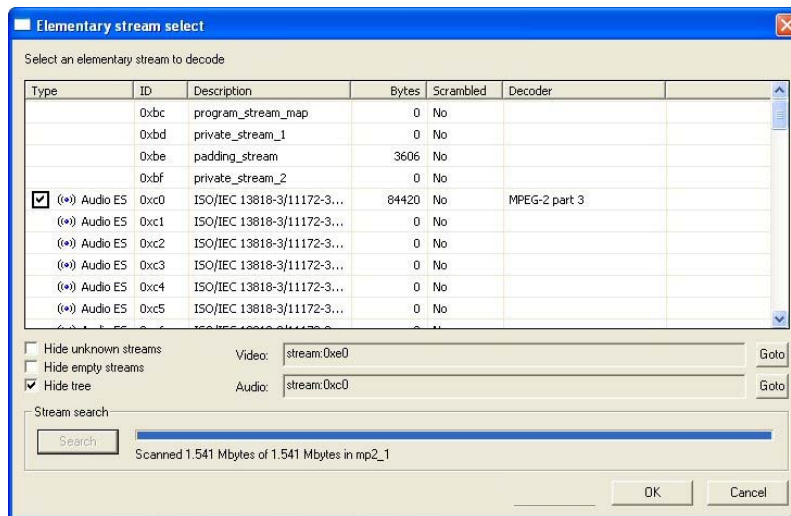
In this case, SyncCert will display the size in the Bytes column with a + sign to the right of the size, as shown in the following figure:

ID	Description	Bytes	Scra
0xe0	ISO/IEC 13818-2/11172-2...	199121+	No

The + sign indicates that the whole file has not been searched and that there may be additional data.

To find the total size of the whole file, and to search other streams, use the Search button. All streams, including the highlighted, or selected stream, are then searched.

When the search is complete, the display will be similar to the next dialog box:

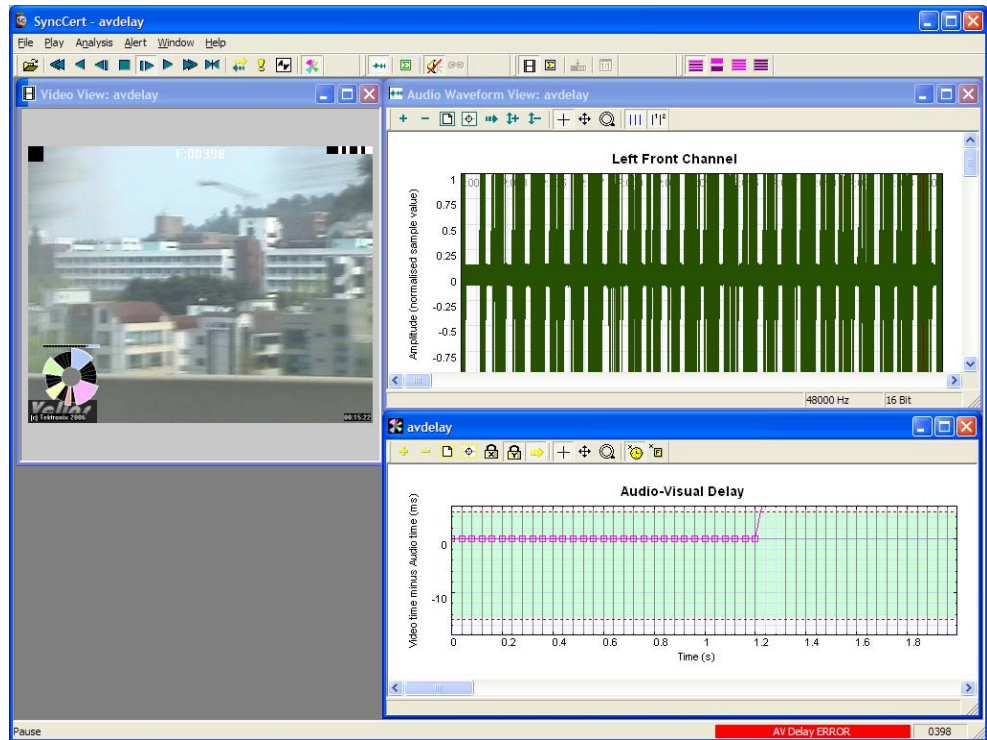



During the search, the blue progress bar fills, until the search is complete.

During the search process, SyncCert will search through all the linked files, and may find other streams. It will be able to determine the total size of the streams found. The result is that the additional streams (and their sizes) will be shown in the stream window.

**OK.** OK opens the selected stream using the decoder shown; if the OK button is grayed out, then the selected stream cannot be opened.

A window is opened with the title of the container file with the track/stream number.



Because SyncCert has recognized that the open file contains both audio and video streams, the video and the audio views are opened. The audio toolbar is also displayed and the synchronize is enabled (see *Synchronize audio*  , page 2-46).

---

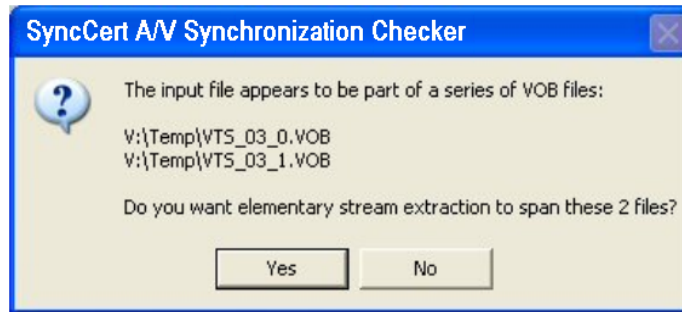
### Opening a VOB/series of VOBs (.vob file extension)

---

**NOTE.** *This only applies to files with a VOB extension. SyncCert treats these files differently when compared to files with other file extensions.*

---

If there are two or more VOBs with sequential numbers from the first VOB selected, then SyncCert will display a popup box:



Clicking Yes means that SyncCert will extract the video Elementary Stream from all the VOBs indicated. Clicking No means that SyncCert will only select the Elementary Stream from the VOB selected in the File open dialog box.

Once this is done, SyncCert uses the standard stream selection dialog box as used for all container files (see *Opening a Container File* on page 2-17).

### Opening an Uncompressed Video File (any file extension)

Uncompressed video files can be opened by selecting YUV, RGB, or grayscale in the Open as type list.

In each case SyncCert ignores the extension and *does not* look for a compressed video standard within the data. It assumes that the data is in one of the following formats.

The YUV data is either:

- 8 bits per sample, 4:2:0
- More than 8 bits per sample, and/or 4:2:2 or 4:4:4 (as used by H.264/AVC High 10, High 4:2:2 and High 4:4:4 profiles and MPEG-2 4:2:2 profile)

**YUV format of 8 bits per sample 4:2:0.** The YUV file output is raw YUV with no headers of any kind. This is the same format used by the Microsoft MPEG-4 Part 2 reference encoder Reference [7] (see *Compression Standards and File Types* section) and used commonly by other programs:

- No headers of any kind (no file or frame headers)
- One byte per sample
- Row raster order (top picture row first)
- Planar YUV 4:2:0 subsampled (4 bytes of Y data for each byte of U data and each byte of V data)
- Y plane values are 0 to 255 unsigned
- U and V plane values are unsigned with a DC offset of 128

**Other uncompressed formats.** The general uncompressed video file format is as follows:

- No headers of any kind (no file or frame headers)
- Concatenated planar image data
- Row raster order (top picture row first)
- Unsigned samples

For 8-bit sample depth:

- One byte per sample

For 9 to 16 bit sample depth:

- Two bytes per sample
- Both little- and big-endian byte orders supported

For YUV format:

- Concatenated Y, U and V planes
- U and V planes subsampled as required
- Y plane samples are unsigned
- U and V plane samples are unsigned with a DC offset of  $2^{n-1}$ , where  $n$  is the chroma sample bit depth



For RGB format:

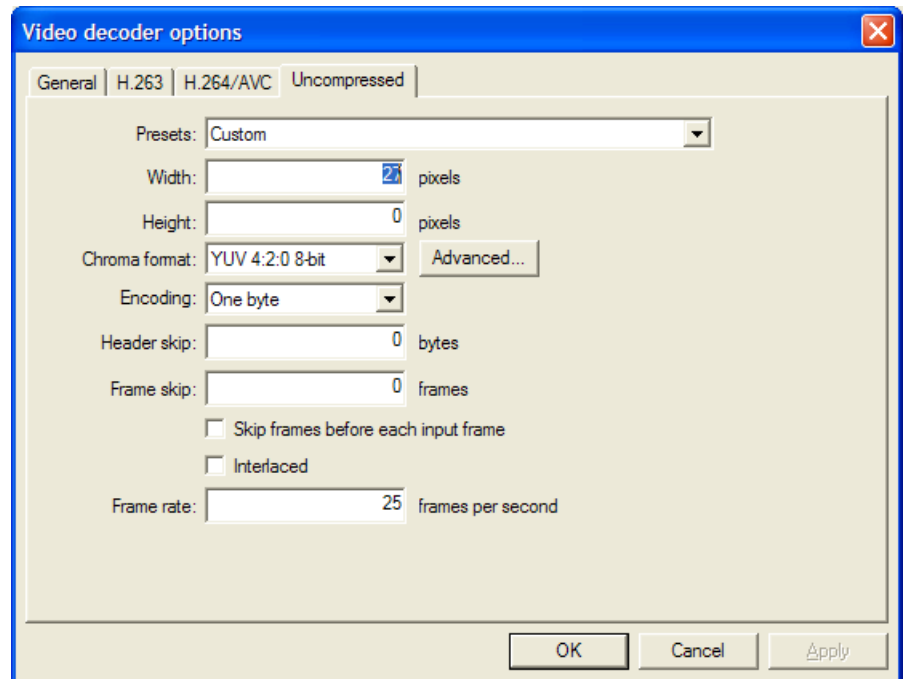
- Concatenated R, G and B planes

For grayscale format:

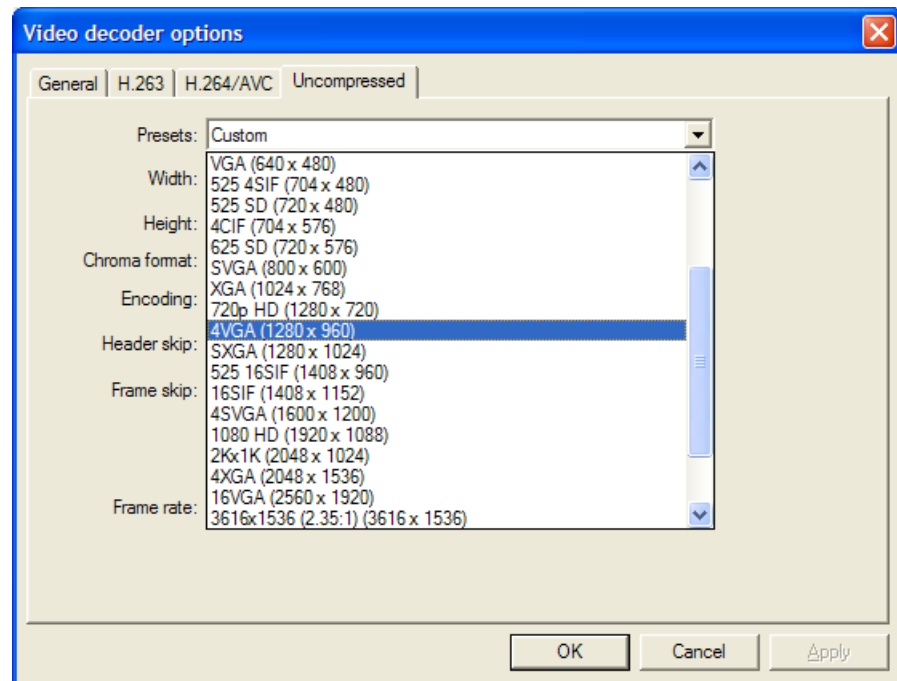
- Luma plane only

When opening an uncompressed video file, SyncCert shows the uncompressed video decoder options. You can then enter the required parameters.

**Setting the uncompressed video frame size, etc.** Within an uncompressed video file, there is no place to indicate the frame size, frame rate, and so forth. So when the uncompressed video file is opened, the SyncCert will display the following screen (this is the Uncompressed tab of the Video Decoder Options dialog box, which can also be accessed from the Play menu):



**Presets (Width and Height).** If there are numbers in the filename that could indicate the frame size, then SyncCert will attempt to read these and offer these in the Width and Height fields shown in the previous screen shot. The correct values can be entered or selected using the drop-down list as shown next.



**Chroma format.** This control specifies the color model and format for the uncompressed video data. The combo provides several common combinations, including 8-bit YUV 4:2:0, 8-bit YUV 4:2:2, 8-bit YUV 4:4:4, 8-bit RGB and 8-bit grayscale. Select an entry from the list to use one of these common formats.

Other formats can be specified by choosing the Custom entry in the list. This will open the Image format dialog.

**Advanced... button.** Click this button to specify a custom chroma format. This will open the Image Format dialog (see *Image format dialog box* on page 2-28).

**Encoding.** This control specifies the encoding of image samples in the file format. The following options are available:

- One byte specifies that image samples are stored in one byte per sample. This format is appropriate if all image planes are 8-bits deep

- Two byte MSB first specifies that image samples are stored in a pair of bytes for each sample. The most significant byte occurs first in each pair (big-endian). This format is appropriate if one or more image planes are deeper than 8-bits
- Two byte LSB first specifies that image samples are stored in a pair of bytes for each sample. The least significant byte occurs first in each pair (little-endian). This format is appropriate if one or more image planes are deeper than 8-bits

**Header skip.** The number of bytes at the start of the file before the first frame. SyncCert will skip past these bytes (ignoring them).

**Frame skip and Skip frames before each input frame.** Frame skip is the number of frames (not bytes) to skip between each frame that is viewed in the video window.

By default, these frames are skipped after each viewed frame. By selecting the Skip frames box before each input frame, the number of frames is skipped before each viewed frame.

**Interlaced.** The uncompressed video file has interlaced data in the format of complete frames, with both fields within one frame, top-field first and each field on alternate lines.

Enabling this check box switches on the Interlace toolbar in SyncCert, which allows the two fields to be viewed independently, either one above the other (top field above bottom field) or either field with the field lines repeated to full frame height.

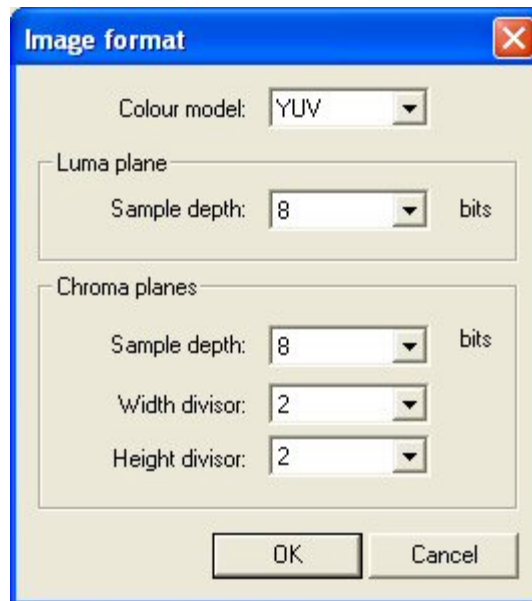
**Frame rate.** The rate at which to display the uncompressed frames, in frames per second.

---

**NOTE.** *The number entered in the Frame rate field can be an integer (for example, 30), a fraction (for example, 30000/1001), or a decimal number (for example, 29.97).*

---

**Image format dialog box.** The Advanced... button opens the following dialog box:



This dialog box allows you to specify a custom image format by choosing a color model, sample depths, and sub-sampling ratios.

**Color model.** Use this control to choose the class of color model for the image format. Options are YUV, RGB, and grayscale.

**Sample depth.** The sample depth controls are used to specify the number of bits per sample for each image plane. For RGB and grayscale, only one sample depth is specified. For YUV, the luma and chroma depths can be specified separately.

**Width divisor.** This control specifies the horizontal sub-sampling factor for YUV chroma planes. This option is only available for YUV color models. The value is the factor by which the image width is divided to find the chroma plane width.

**Height divisor.** This control specifies the vertical sub-sampling factor for YUV chroma planes. This option is only available for YUV color models. The value is the factor by which the image height is divided to find the chroma plane height.

## Close Stream

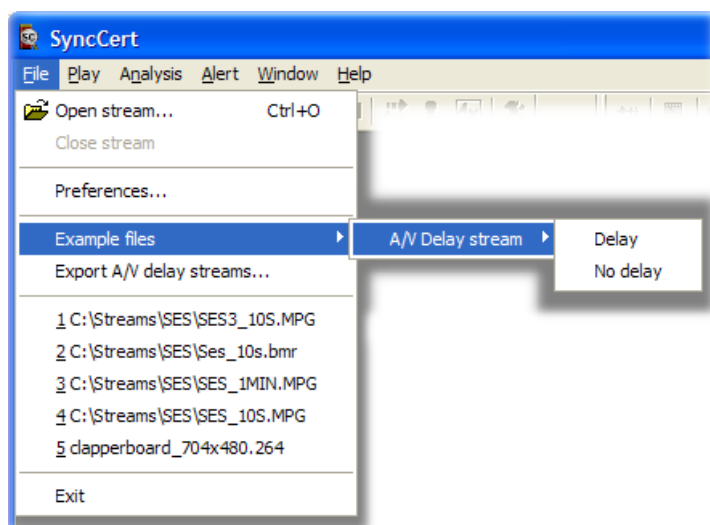
This allows you to close the current stream but keeps the SyncCert window open.

## Preferences

The Preferences dialog box allows you to select the audio playback device. Your selection will depend on the your PC setup.

## Example Files...

This option offers files that can be played/analyzed in SyncCert:



### A/V Delay streams

Name	Standard	Warnings/Errors
Delay	MPEG-2 Video; AC3 Audio	Changing A/V delay
No Delay	MPEG-2 Video; AC3 Audio	No A/V delay

## Export A/V Delay Streams...

The A/V Delay measurement (see page 2-54) provides a complete solution for measuring audio/video synchronization delay in an encoding system. The Export A/V Delay Streams menu option allows the supplied test streams to be exported in a variety of formats for use with encoding systems.

You can use the standard Windows controls (Ctrl and Shift) to select multiple output formats for a selected stream.

---

**NOTE.** *Some of the export formats can produce very large files. Ensure that you have enough disk space to accommodate the output.*

---



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**NOTE.** *The Export A/V Delay Streams feature uses parts of the file archiving utility 7-Zip. 7-Zip is licensed under the GNU LPGL (Lesser General Project License). For more information, refer to the 7-Zip Web site ([www.7-zip.org](http://www.7-zip.org)).*

---

Both video and audio streams can be exported. You need to be careful to match the correct audio with each video file because the timings of the audio signal vary slightly depending upon the frame rate of the video that it is to be paired with.

The supplied video formats are shown in Table 2-1.

**Table 2-1: Format Combinations**

ID	Desc	Width	Height	Frame rate	Picture aspect ratio	Pixel Aspect Ratio	Chroma sub-sampling	Scan	Sample rate (kHz)	Sample depth	Channels	Video comp	Audio Comp	Container	Note
1	PAL raw video	720	576	25	4:3	1:1.25	4:2:0	Int	-	-	-	Raw	-	-	-
2	NTSC raw video	720	480	29.97	4:3	1:1.25	4:2:0	Int	-	-	-	Raw	-	-	-
3	720p25 raw video	1280	720	25	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-
4	720p30 raw video	1280	720	30	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-
5	720p50 raw video	1280	720	50	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-
6	720p60 raw video	1280	720	60	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-
7	1080i25 raw video	1920	1080	25	16:9	1:1	4:2:0	Int	-	-	-	Raw	-	-	-
8	1080i30 raw video	1920	1080	30	16:9	1:1	4:2:0	Int	-	-	-	Raw	-	-	-
9	1080p50 raw video	1920	1080	50	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-
10	1080p60 raw video	1920	1080	60	16:9	1:1	4:2:0	Prog	-	-	-	Raw	-	-	-

**Table 2-1: Format Combinations (continued)**

ID	Desc	Width	Height	Frame rate	Picture aspect ratio	Pixel Aspect Ratio	Chroma sub-sampling	Scan	Sample rate (kHz)	Sample depth	Channels	Video comp	Audio Comp	Container	Note
11	PCM 16-bit raw audio	-	-	25	-	-	-	-	48	16	2	-	Raw	-	For vid ID 1
12	PCM 16-bit raw audio	-	-	29.97	-	-	-	-	48	16	2	-	Raw	-	For vid ID 2
13	PCM 24 bit raw audio	-	-	25	-	-	-	-	48	24	2	-	Raw	-	For vid ID 3
14	PCM 24 bit raw audio	-	-	30	-	-	-	-	48	24	2	-	Raw	-	For vid ID 4
15	PCM 24 bit raw audio	-	-	50	-	-	-	-	48	24	2	-	Raw	-	For vid ID 5
16	PCM 24 bit raw audio	-	-	60	-	-	-	-	48	24	2	-	Raw	-	For vid ID 6
17	PCM 24 bit raw audio	-	-	25	-	-	-	-	48	24	2	-	Raw	-	For vid ID 7
18	PCM 24 bit raw audio	-	-	30	-	-	-	-	48	24	2	-	Raw	-	For vid ID 8
19	PCM 24 bit raw audio	-	-	50	-	-	-	-	48	24	2	-	Raw	-	For vid ID 9
20	PCM 24 bit raw audio	-	-	60	-	-	-	-	48	24	2	-	Raw	-	For vid ID 10
21	TS MPEG-2 AAC PAL	720	576	25	4:3	1:1.25	4:2:0	Int	48	16	2	MPEG-2 MP@ML	MPEG-2 part 3	MPEG-2 TS	-
22	TS MPEG-2 AAC NTSC	720	480	29.97	4:3	1:1.25	4:2:0	Int	48	16	2	MPEG-2 MP@ML	MPEG-2 part 3	MPEG-2 TS	-
23	TS MPEG-2 AC-3 HD 720p	1280	720	30	16:9	1:1	4:2:0	Prog	-	-	-	MPEG-2 MP@HL	AC-3	MPEG-2 TS	-
24	TS MPEG-2 AC-3 HD1080i	1920	1080	30	16:9	1:1	4:2:0	Int	-	-	-	MPEG-2 MP@HL	AC-3	MPEG-2 TS	-

Int = interlaced; Prog = progressive;

For all sequences: Color model = YUV; Sample depth = 8 bits

## Recent File

The program retains a list of the eight most recently used files, numbered 1 to 8. The recent files can be selected by highlighting them.

## Exit

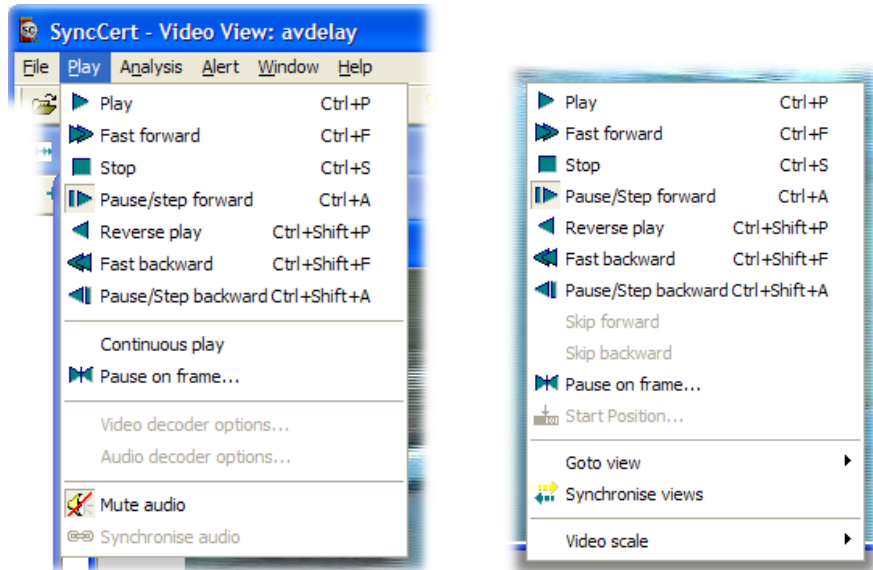
This option exits from SyncCert.





# Play Menu









This menu controls the playing of the compressed file. In addition to the menu selection, there is a right-click popup Play menu:




The functions of each of these Play menu items are explained on the following pages. (For the items below the Play menu, see *Synchronised Views/Navigating the Views* on page 2-7 and *Video Scale* on page 2-71.)


## Audio/Video Synchronization

SyncCert will decode and analyze audio as well as video streams, but the audio will only be played and audible when the stream is in forward play mode.

Icon	Function
	Plays file quickly backwards. Audio muted.
	Plays file backwards to beginning. Audio muted.
	Pressed once in Play mode, pauses. Pressed again, steps back 1 frame. Audio muted.
	Stops all.
	Pressed once in Play mode, pauses. Pressed again, or at top of file, steps forward 1 frame. Audio muted.
	Plays to end or specified frame or until paused.
	Plays quickly in forward direction. Audio muted.
	Pauses when specified video frame is reached.

### Play Ctrl+P

When selected, this plays the compressed stream, video or audio, until it reaches the end of the data. However, if, when playing a compressed video stream, a frame number has been set in Pause on frame...  the video will pause at this frame number.

If a file containing both audio and video streams is being played, and the streams are not synchronized, the video and audio will begin to play and continue to play independently. So, if a compressed video file is playing slowly due to the available processing power of the PC, it is likely that the video will lag behind the accompanying audio stream. If audio synchronization is selected, the rate at which the audio data is decoded adjusts and the audio stream keeps pace with the video, by means of timestamps. (See Synchronize audio  on page 2-46 for more information about audio synchronization.)

---

**NOTE.** Depending upon the speed of your PC, when playing compressed video, the standard in use and the size of the video frames being viewed, there can be a significant delay after pressing the Play or Pause/Step forward button, during which the message *Buffering <nnn>* (*nnn* is a number) is displayed near the top of the video window.

*The Buffering message indicates that the video decoder is loading the required number of video frames into its internal buffer. This message disappears when the video is ready to display. (This is most likely to be seen with the H.264/AVC video standard, where up to 16 frames are loaded into the decoder buffer before displaying the first frame.)*

---

## Fast Forward Ctrl+F

When this option is selected, the compressed file will be played in Fast forward mode, played more quickly than normal. The speed at which this is replayed depends on the speed of the computer you are using.

If a file containing both audio and video streams is being played, regardless of synchronization, the video plays fast forward and the audio is muted.


---


**NOTE.** When playing video forwards or backwards, SyncCert buffers the video and associated data. By default, SyncCert allocates a buffer size of 100 MB. The amount of buffer required per frame of video and associated data varies considerably with the video size and the video standard. Typically, 100 MB is sufficient to buffer the video and data for 10-500 frames.


*To change the buffer size, use the Play menu, Video Decoder options, General tab. See Video Decoder Options... on page 2-38 for more information.*

---

The video frame count is given in a box at the top of the image, to indicate how far through the video sequence the currently displayed frame is. The frame count is also displayed at the bottom right of SyncCert window in the status bar.

The frame count is displayed in white text if the option in the Overlay menu is currently set to White, or in black text if this is set to Black (toolbar icon  or Ctrl+W).

The fast forward may be stopped at any time by clicking the Pause/Step forward icon -  (or pressing Ctrl+A).

If a frame number has been set in Pause on frame... , the video will pause at this frame number.

## Stop Ctrl+S

When this option is selected, it will stop the playing of the compressed file.

## Pause/Step Forward Ctrl+A

This option can be selected from the Play menu, by pressing Ctrl+A, or by clicking the tool bar icon Pause/Step forward .

This command is available when playing audio files, but audio will only be heard when the stream is in forward play mode.

---


**NOTE.** *Repeated selection of this option will advance the displayed video one frame at a time.*

---

This has two functions:

- If the file is playing, selecting this option will pause the decoding of the stream and, in the case of a video file, display the most recently decoded frame
- If the file has stopped or is already paused, selecting this option causes the file to advance by one displayed frame

---

**NOTE.** *See the Note under Fast Forward  Ctrl+F on page 2-35 regarding a possible buffering delay immediately after this is selected.*


*In H.264/AVC where SI-frames and/or SP-frames are used, when using Pause/Step forward (Ctrl+A), at the point of the switch, both the frames used for the switch are displayed, one after the other. These are not fully displayed in the video when it is viewed normally, and so are not displayed when using Play or Fast forward selections.*

---

## Fast Backward Ctrl+Shift+F

Play the file backwards, as fast as possible, while still displaying it.


This command is unavailable when playing audio files. Audio will only be heard when the stream is in forward play mode.

This option can be selected from the Play menu or by pressing Ctrl+Shift+F, or by clicking the tool bar icon Fast backward - .

## Pause/Step Backward Ctrl+Shift+A

Step backwards through the video file one displayed frame at a time.

See also the notes under *Pause/Step Forward*  *Ctrl+A* on page 2-36.

This option can be selected from the Play menu, or by pressing *Ctrl+Shift+A*, or by clicking the tool bar icon *Pause/Step backward* - .

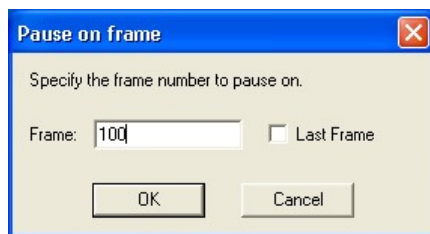
## Continuous Play

When this option is selected and *Play/Fast forward* is clicked, then the file will be continually played in a loop. That is, the file is decoded until its end, at which point decoding will start again at the beginning of the file, until *Stop* or *Pause* is used.

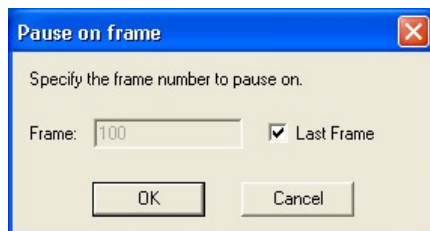
Audio will only be heard when the stream is in forward play mode.

## Pause on Frame...

This option allows you to select a frame number to pause on when the file is played. Having selected a frame to pause on, and clicking *Play* or *Fast forward*, or *Blind fast forward*, the video will play until the selected frame number and then pause.



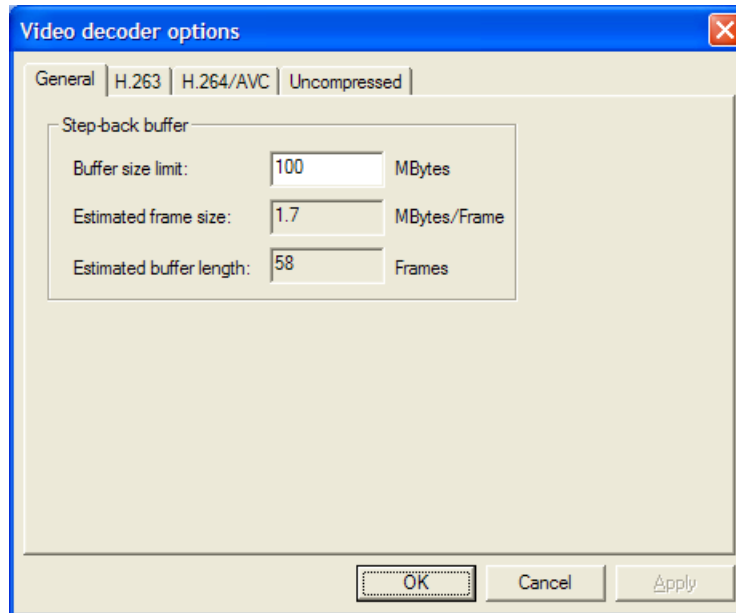
The last frame can be selected by using the *Last Frame* box. When this is done, the video pauses on the last frame. The previously entered frame number (if there is one) is still stored, and can be enabled again by clearing the *Last Frame* check box:



## Video Decoder Options...

The Video Decoder dialog box has various tabs that set the video decoder options for each standard. When there are no configurable options for a particular video standard, there is no tab on the dialog.

### General



**Step-back buffer.** This buffer is used to hold the video and associated data, to make video play (forwards and backwards) occur without delay.

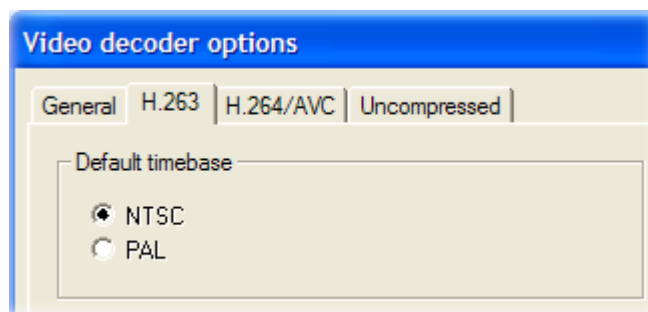
---

**NOTE.** *The size of the step-back buffer is shown, with an estimation of how many frames of data can be held within this buffer size. When playing video forwards or backwards, SyncCert buffers the video and associated data. By default, SyncCert allocates a buffer size of 100 MB. The amount of buffer required per frame of video and associated data varies considerably with the video size and the video standard. Typically, 100 MB is sufficient to buffer the video and data for 10 to 500 frames.*

*The popup alerts (Warnings, Errors, and so forth) that occur when video is decoded by SyncCert, are not displayed if the video and associated data is in the Step-back buffer. See Video Decoder Options... on page 2-38 for more information.*

---

## H.263



This has no effect and is grayed out for standards other than H.263.

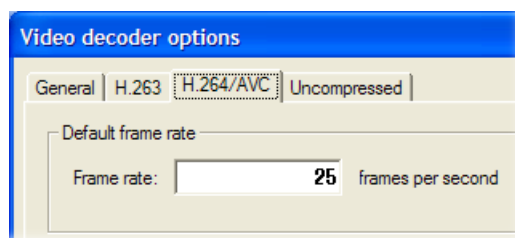
**NTSC/PAL option.** Within the H.263 standard, the NTSC standard is assumed (frame rate of 29.97 frames per second) and video is played back at this frame rate by default. The NTSC option is selected as standard.

Sometimes H.263 video in PAL format (frame rate of 25 frames per second) does not set these options. In this situation, PAL video would play back at 29.97 frames per second and it would play too quickly. Selecting the PAL option on this tab will play the decoded video at 25 frames per second.

## H.264/AVC

Many H.264/AVC byte streams do not provide the SEI (Supplemental enhancement information ) data for specifying a frame rate, as this is optional in the byte stream (and where this happens, the frame play data is typically provided at the systems level for the video decoder).

Therefore, the setting is provided on the decoder option tab, so that the stream will play at the correct frame rate when the appropriate SEI data is not present.



### **Uncompressed Video**

The data is either:

- 8 bits per sample, 4:2:0, or
- More than 8 bits per sample, and/or 4:2:2 or 4:4:4 (as used by H.264/AVC High Profile/FRExt, High/10, High/4:2:2, High/4:4:4)

**YUV format of 8 bits per sample 4:2:0.** The YUV file output is raw YUV with no headers of any kind. This is the same format as used by the Microsoft MPEG-4 Part 2 reference encoder (see *Compression Standards and File Types* section) and as used commonly by other programs:

- No headers of any kind (no file or frame headers)
- One byte per sample
- Row raster order (top picture row first)
- Planar YUV 4:2:0 sub-sampled (4 bytes of Y data for each byte of U data and each byte of V data)
- Y plane values are 0 to 255 unsigned
- U and V plane values are unsigned with a DC offset of 128

**Other uncompressed formats.** The general uncompressed video file format is as follows:

- No headers of any kind (no file or frame headers)
- Concatenated planar image data
- Row raster order (top picture row first)
- Unsigned samples

For 8-bit sample depth:

- One byte per sample

For 9 to 16 bit sample depth:

- Two bytes per sample
- Both little- and big-endian byte orders supported

For YUV format:

- Concatenated Y, U and V planes



- U and V planes sub-sampled as required
- Y plane samples are unsigned
- U and V plane samples are unsigned with a DC offset of  $2^{n-1}$ , where  $n$  is the chroma sample bit depth

For RGB format:

- Concatenated R, G and B planes.

For grayscale format:

- Luma plane only

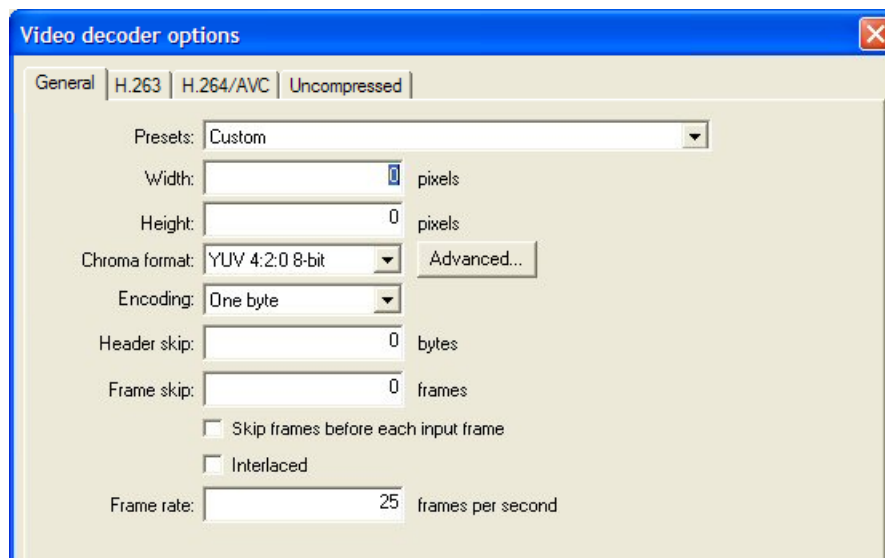
When opening an uncompressed video file, SyncCert shows the uncompressed video decoder options. You can enter the required parameters.

---

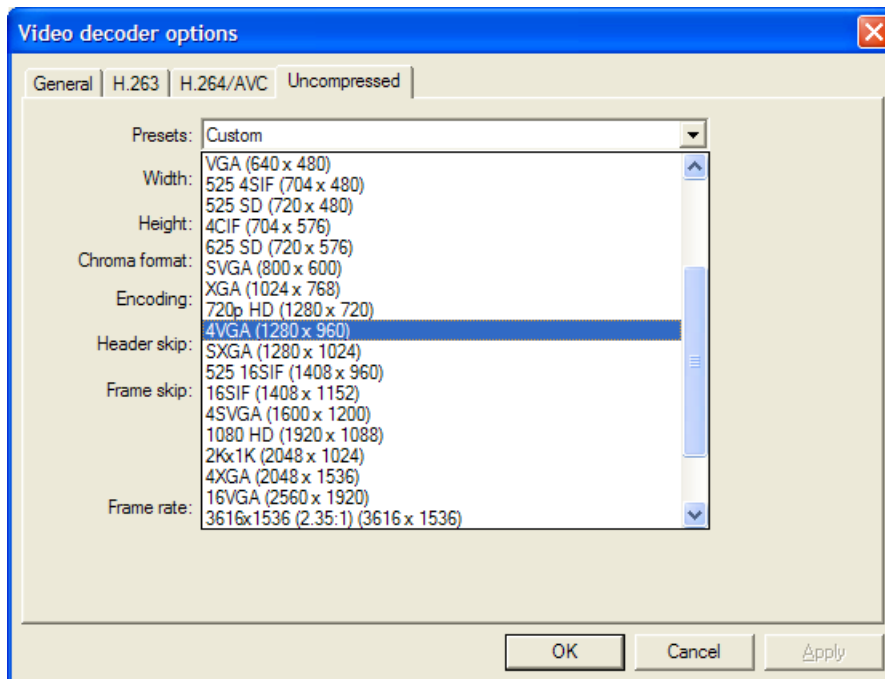
**NOTE.** *If you try to open an .m4v or .264 or other compressed video file by using Open as uncompressed video, SyncCert will not decode the compressed video but will assume it is in uncompressed format.*

---

**Setting the frame size.** Within an uncompressed video file, there is no place to indicate the frame size, frame rate, and so forth. When the file is opened, SyncCert will display the following dialog box. This is a tab of the Decoder options, which can also be accessed from the Play menu, Video Decoder options:



**Presets (Width and Height).** If there are numbers in the filename that could indicate the frame size, then SyncCert will attempt to read these and offer these in the Width and Height fields shown in the previous screenshot. The correct values can be entered or selected using the drop-down list:



**Chroma format.** This control specifies the color model and format for the uncompressed video data. The drop-down list provides several common combinations, including 8-bit YUV 4:2:0, 8-bit YUV 4:2:2, 8-bit YUV 4:4:4, 8-bit RGB and 8-bit grayscale. Select an entry from the list to use one of these common formats. Other formats can be specified by choosing the Custom entry in the list. This selection will open the Image format dialog box.

**Advanced... button.** Click this button to specify a custom chroma format - this will open the Image Format dialog, see *Image format dialog box* on page 2-28.

**Encoding.** This control specifies the encoding of image samples in the file format. The following options are available:

- One byte specifies that image samples are stored in one byte per sample. This format is appropriate if all image planes are 8-bits deep
- Two byte MSB first specifies that image samples are stored in a pair of bytes for each sample. The most significant byte occurs first in each pair (big-endian). This format is appropriate if one or more image planes are deeper than 8-bits

- Two byte LSB first specifies that image samples are stored in a pair of bytes for each sample. The least significant byte occurs first in each pair (little-endian). This format is appropriate if one or more image planes are deeper than 8-bits

**Header skip.** The number of bytes at the start of the file before the first frame; SyncCert will skip past these bytes (ignoring them).

**Frame skip and Skip frames before each input frame:** Frame skip is the number of frames (not bytes) to skip between each frame that is viewed in the video window.

By default, these frames are skipped after each viewed frame. By selecting the Skip frames box before each input frame, the number of frames are skipped before each viewed frame.

**Interlaced:** The uncompressed video file has interlaced data in the format of complete frames, with both fields within one frame, top-field first and each field on alternate lines.

Enabling this check box switches on the Interlace toolbar in SyncCert which allows the two fields to be viewed independently, one above the other (top field above bottom field), or either field with the field lines repeated to full frame height.

**Frame rate.** The rate at which to display the uncompressed frames, in frames per second.

---

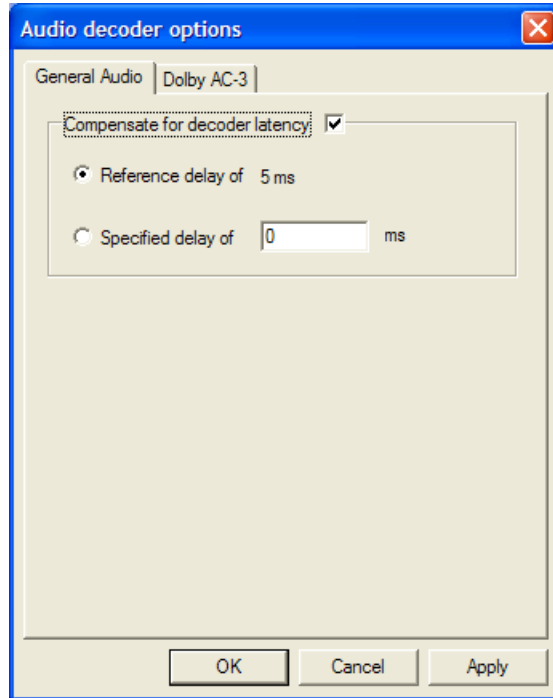
**NOTE.** *The number entered in the Frame rate field can be an integer (for example, 30), a fraction (for example, 30000/1001), or a decimal number (for example, 29.97).*

---

## Audio Decoder Options...

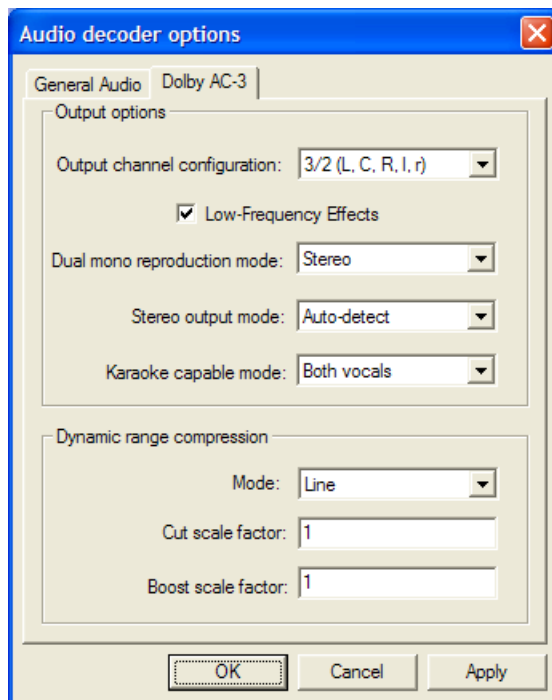
The Audio Decoder option is enabled only when audio is present in a stream.

**General Audio.** Where a decoder has inherent latency, SyncCert can compensate automatically.



With Compensate for decoder latency selected, a reference delay appropriate for the decoder in use is automatically available. If you want to specify a different delay, enter the value in the Specified delay field and select the option.

**Dolby AC-3.** The Audio Decoder Dolby AC-3 tab allows you to set up output options and dynamic range compression values.



The fields correspond to those used in the Dolby AC-3 development kit (the kit is available from Dolby Laboratories). Changes will take effect the next time the stream is played (that is, decoded).

## Mute audio

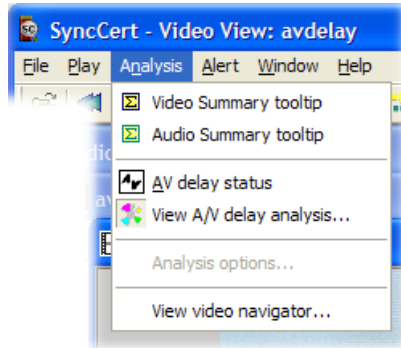
Clicking on this button turns the sound on/off. The audio stream will continue to decode, even with sound disabled.

## Synchronize audio

Without synchronization enabled, audio and video streams play independently, at rates determined by the available processing power of your PC, with audio usually playing more quickly than video. When the Synchronize audio icon is selected, audio data will be played as the video frame to which it pertains is played. Full details can be found under *Audio/Video Synchronization* on page 2-34.

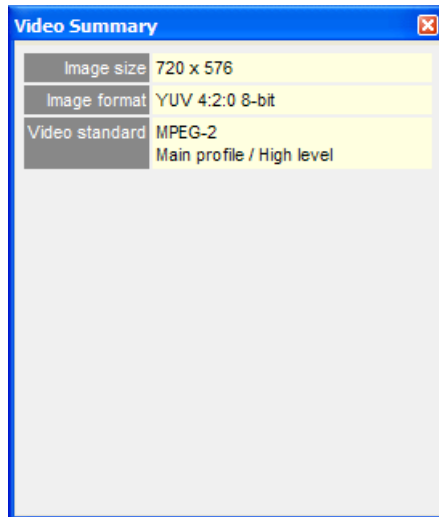
This menu item and icon are only available when a file containing both audio and video is loaded.

# Analysis Menu



In addition to statistical information the Analysis menu item provides access to Video Navigator and the A/V Delay Analysis. The Video Analysis option allows the A/V delay settings to be edited.

## Video Summary Tooltip **Ctrl+U**



When this is switched on, a window is displayed that provides summary information about the frame being displayed or the sequence as a whole. The window can be dragged to any position within SyncCert main window.

---

**NOTE.** *The titles in the Summary tooltip and the displayed information vary with the selected video standard and the options that have been used in the specific video file.*

---

If the sequence has not been decoded to the end, then the summary up to that point is provided. The information given is described in detail below.

**Image size [All standards].** Picture size in pixels, Width x Height ( pixel Columns x Rows).

For H.264/AVC where the cropping rectangle feature has been used, the full image size is given and displayed in the video window, but the cropped image size is also given in this field of the tooltip in the form:

**Image format [All standards].** Format of selected video file

**Video standard [All standards].** The video standard used, with various additional information as appropriate, such as:

- [MPEG-4]:
  - Profile and Level, if this information is given in the file
  - Data partitioning, Resync, RVLC, as appropriate
  - [MPEG-4 Advanced Simple Profile] Interlace, QS, Method 1 quant, as appropriate
- [MPEG-2, VC-1]:
  - Profile and Level
- [H.264/AVC]:
  - Profile and Level
  - Entropy coding mode, CAVLC

---

**NOTE.** *For H.264/AVC, many of the other elements (for example, data partitioning) can vary by frame/slice (and in some cases MacroBlock by MacroBlock), so these other elements are reported in the MacroBlock tooltip.*

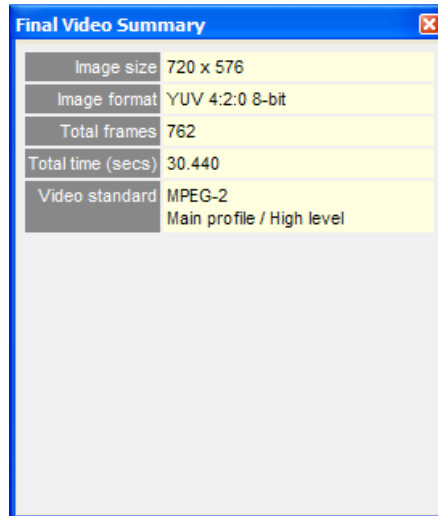
---

- [H.263] Annexes, as appropriate.



### Summary Tooltip at the end of a Video Sequence

When the file is completely decoded, the final summary tooltip displays as follows:

A screenshot of a software tooltip window titled "Final Video Summary". The window has a blue title bar with a close button (X) on the right. The main content area is a table with a light yellow background and a grey border. The table lists video metadata: Image size (720 x 576), Image format (YUV 4:2:0 8-bit), Total frames (762), Total time (secs) (30.440), and Video standard (MPEG-2 Main profile / High level).

Property	Value
Image size	720 x 576
Image format	YUV 4:2:0 8-bit
Total frames	762
Total time (secs)	30.440
Video standard	MPEG-2 Main profile / High level

The meanings of Image size, File size (KB) and Standard are the same as described previously.

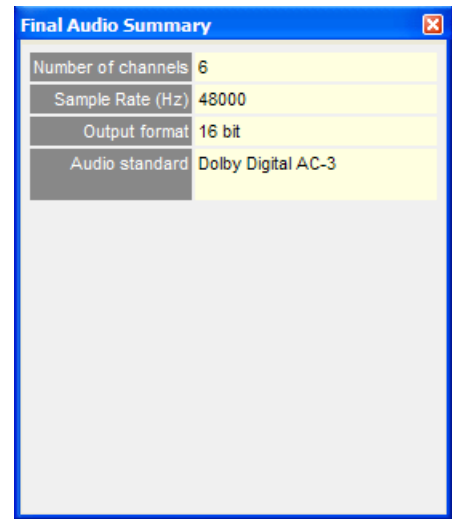
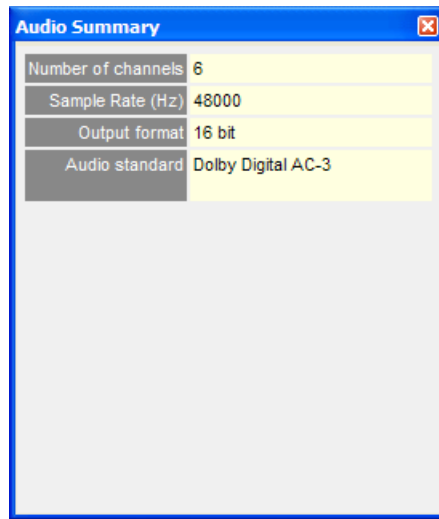
The additional items displayed are:

**Total frames.** The total decoded frames in the sequence.

**Total time (secs).** The total time in seconds from the start to the end of the sequence, calculated as if the sequence were playing normally (SyncCert keeps track of the playing time, regardless of whether the sequence is paused at some point or played in fast forward mode).

## Audio Summary Tooltip

When this option is selected, a window is displayed that provides summary information about the audio frame being displayed or the sequence as a whole. The information displayed differs depending on whether the stream is playing/paused or is in stop mode. The selection of information provided by the audio summary tooltip is as follows:



**Number of Channels.** If the audio stream is mono, this number will be one (1); if the stream is stereo, this number will be two or more.

**Sample Rate (Hz).** Sample rate of the decoded audio in samples per second (Hz).

**Output Format.** The output audio sample format bit depth in bits per sample.

**Audio Standard.** The audio standard used.

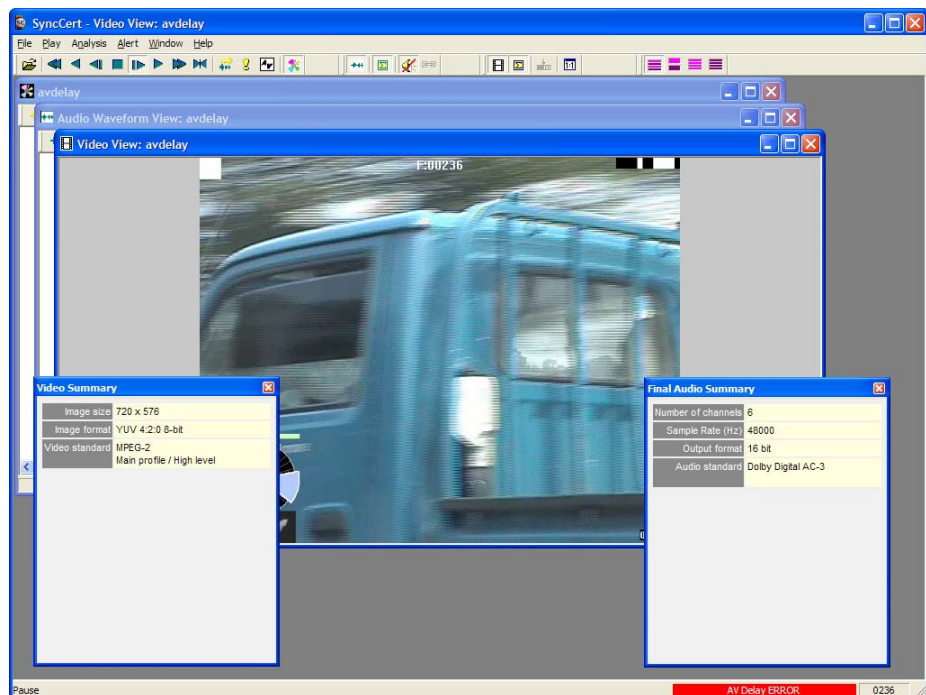
## Summary Tooltips Manipulation

The video and audio summary tooltips move and dock in the same way.

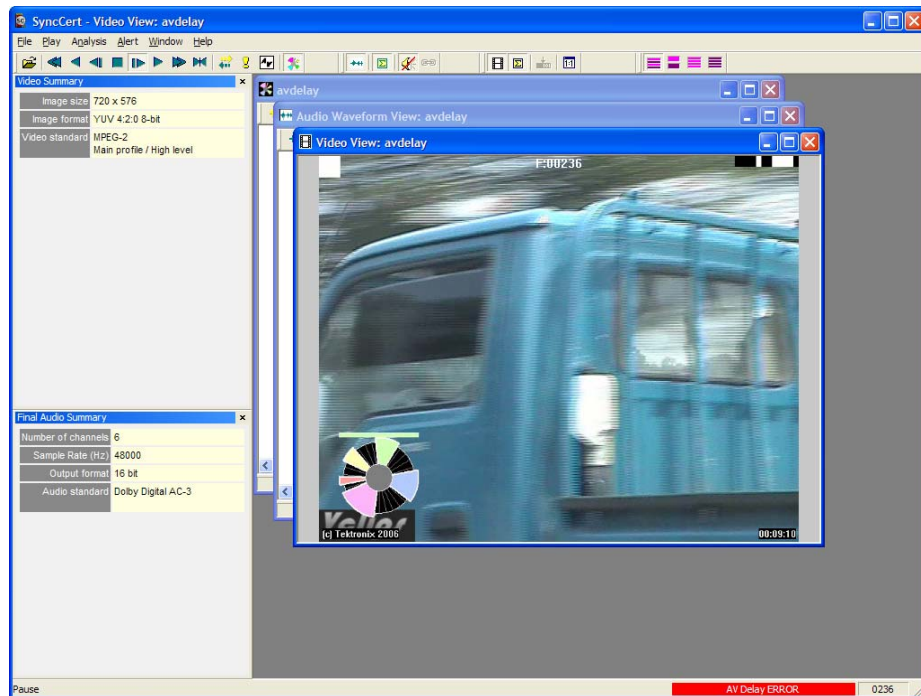
**NOTE.** *When the tooltips are dragged near the edge of the window, they automatically dock. To force undocking, press and hold the Ctrl key while dragging with the mouse.*

The tooltips bring up independent windows that can be:

- Moved around within the main window and put next to a video window:



- Docked to one of the edges of the main window:



When the Summary tooltip is docked (as in the preceding figure):

- And the window is maximized, the Summary tooltip remains visible and the other window is only maximized into the space available
- The title bar of the Summary tooltip changes to a pale color to indicate it is docked (and the title text is no longer bold)

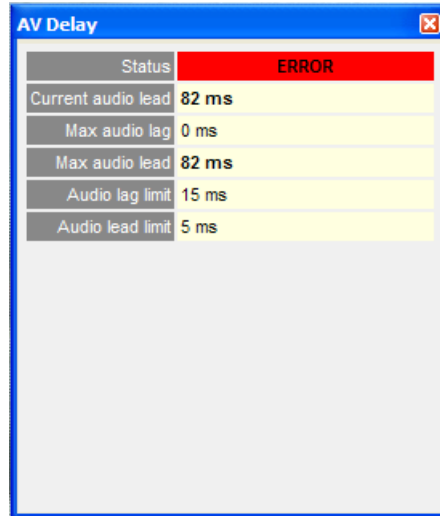
### Docking/undocking

- To dock the Summary tooltip: drag it to one of the edges of the main window (top, left, right, bottom).
- To undock, hold the keyboard control (Ctrl) key and click on the title bar.

### Scrolling/scroll bars

When the available area is too small for the whole tooltip to be seen, scroll bars are automatically displayed.

## Audio/Video Delay Status



The screenshot shows a dialog box titled "AV Delay" with a red close button in the top right corner. The dialog contains a table with the following data:

Status	ERROR
Current audio lead	82 ms
Max audio lag	0 ms
Max audio lead	82 ms
Audio lag limit	15 ms
Audio lead limit	5 ms

**Status.** Current Error status.

**Current audio lead.** The current audio lead.

**Max audio lag.** The maximum audio lag experienced up to this point in the playout.

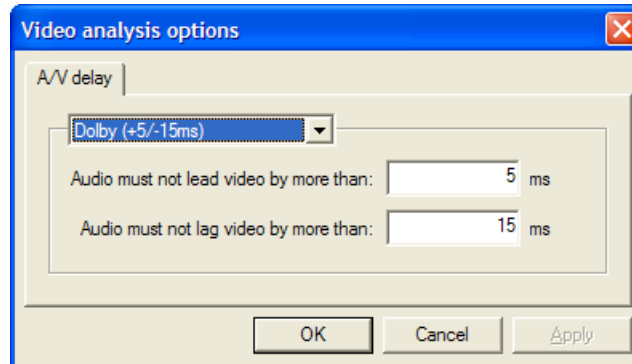
**Max audio lead.** The maximum audio lead experienced up to this point in the playout.

**Audio lag limit.** The audio lag limit (set in the Audio options dialog box).

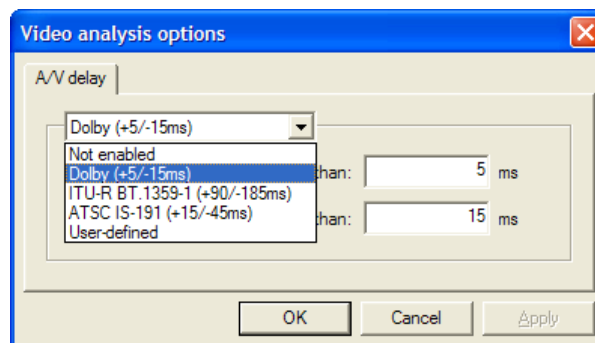
**Audio lead limit.** The audio lead limit (set in the Audio options dialog box).

## Analysis Options...

The Analysis options menu option opens the Video Analysis options dialog box. When enabled, the feature allows you to select preset or user selected delays. These allow you to measure audio/video delay, which may have been introduced when encoding elementary streams.



Select the required option from the drop-down list; the preset lead and lag values are shown in the list. If you want to set your own delay values, select User Defined and enter values in the lead and lag fields.

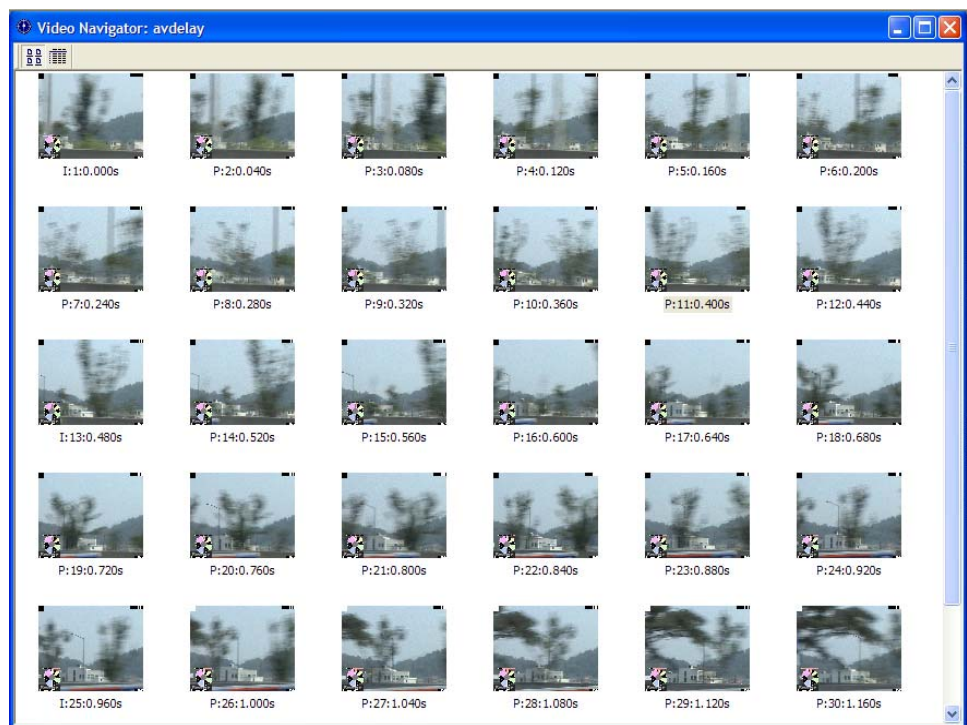


## View Video Navigator...

### Thumbnail View

This shows a thumbnail view of the frames in a video file, with some basic information.

Two different views can be selected. In either case, a right-click context-sensitive menu allows selection of the other views and navigation to the corresponding frame in the other views (or the start address of the corresponding frame, as appropriate). See *Right-click popup menu/Goto views.* on page 2-57.



The video frames are shown in display order (decode order can be different if there are B-frames/B-VOPs).

The displayed information is:

- Frame type/VOP type
- Display frame/VOP number
- Display time in seconds

## Detail View

Display	Type	Decode	Display tim...	Size (bits)	Address (b...
1	I	1	0.000	232344	0x00001e
2	P	2	0.040	716008	0x007173
3	P	3	0.080	697280	0x01cf10
4	P	4	0.120	712904	0x032388
5	P	5	0.160	716872	0x047fa1
6	P	6	0.200	721408	0x05ddaa
7	P	7	0.240	718144	0x073dea
8	P	8	0.280	712888	0x089c92
9	P	9	0.320	477576	0x09f8a9
10	P	10	0.360	351080	0x0ae1da
11	P	11	0.400	279024	0x0b8d47
12	P	12	0.440	355392	0x0c1585
13	I	13	0.480	345320	0x0cc32b
14	P	14	0.520	349760	0x0d6baa
15	P	15	0.560	327656	0x0e1672
16	P	16	0.600	288360	0x0eb66f
17	P	17	0.640	291104	0x0f433c

The displayed information is:

- Display frame/VOP number
- Frame type/VOP type

---

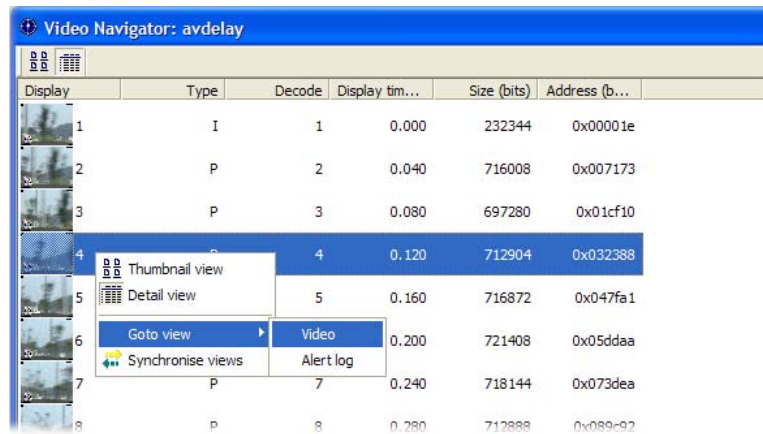
**NOTE.** For interlaced bitstreams, the reported frame/VOP type is the type relating to the second field in a frame. This means that if the top field is first in frame/VOP 1 (and this will always be Intra-coded) and the bottom field is Inter [P] coded, the frame will be reported as P.

---

- Decode frame/VOP number
- Display time in seconds
- Frame size in bits
- Address of start of frame (in the video elementary stream, not in the overall container file if there is one)

The columns may be resized and dragged into a different order if desired.

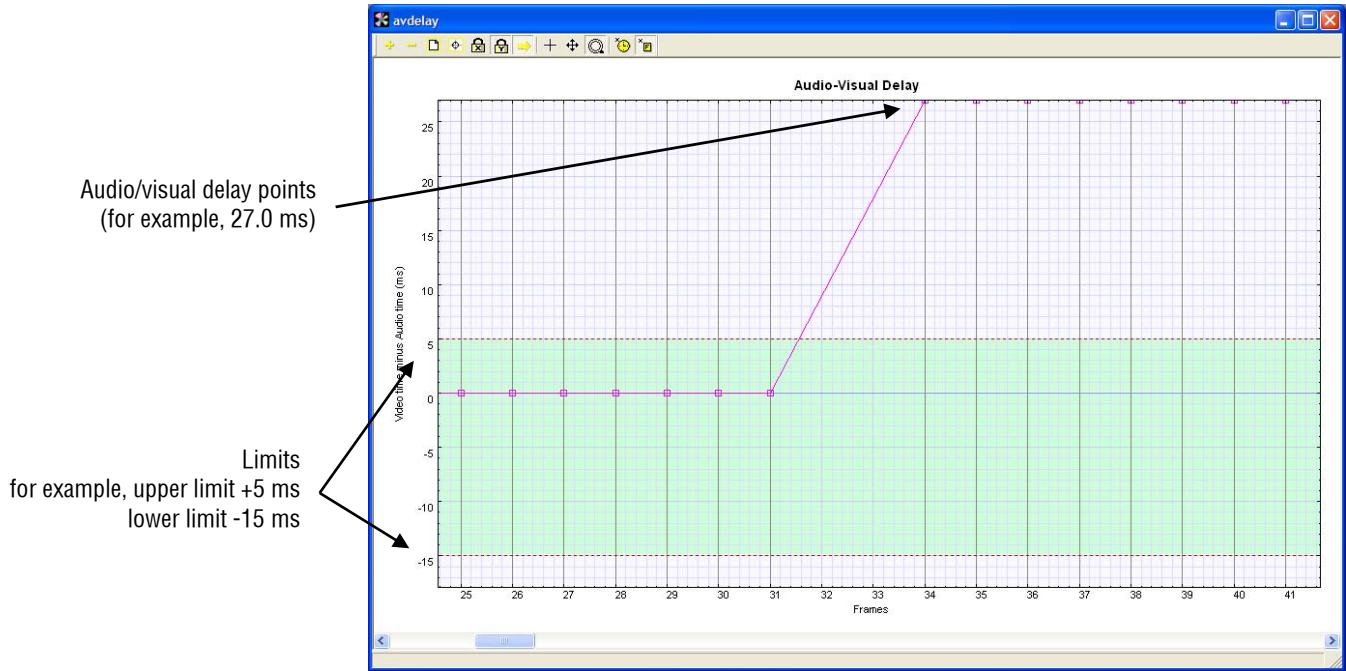


**Right-click popup menu/Goto views.**

See *Synchronized Views/Navigating the Views* on page 2-7 for more information on navigating between views.

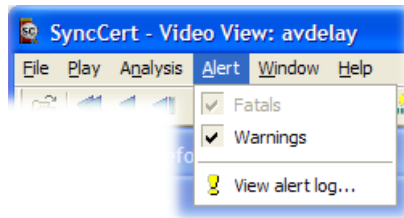
## View A/V Delay Analysis... (🌸)

Select Analysis > View A/V delay analysis... to display the A/V Delay graph. You will need to decode the stream to view the results.



The audio/visual limits you set (either preset or user-defined) are displayed in green. The actual delay is shown in red. In the preceding example, the limits are set at +5 ms and -15 ms. The example stream that has been decoded shows that from frame 34 onwards the audio leads the video by 27.0 ms.

# Alert Menu



This menu controls the setting of the overall level of the popup alerts and gives access to configure individual alerts as enabled/disabled.

These popup alerts occur when the video is being decoded. Consequently:

- The popup alert appears when the frame concerned is decoded, but for bitstreams containing B-frames/B-VOPs, the display order of frames/VOPs may be different
- When seeking backwards/forwards through a stream, the popup alerts will not appear if that part of the bitstream has already been decoded and is in the step-back buffer cache (see *Video Decoder Options...* on page 2-38).

## Alert Levels

There are two levels of alerts: Fatal and Warning (in order of decreasing severity).

When a less severe alert is set, the more severe alerts are set automatically. (For example, setting Warnings on automatically sets Fatal on.)

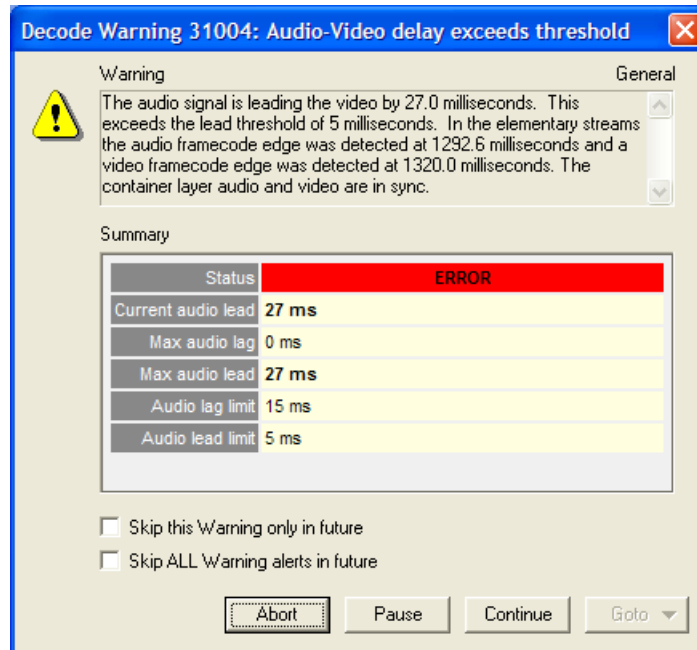
---

**NOTE.** *The Fatal alert is always set (and cannot be turned off). Each time a video stream is opened in SyncCert, all Alerts are reenabled.*

---

When an alert is triggered, a message box is displayed. At the same time, decoding is suspended.

The message box will provide you with the reason that decoding was interrupted.



### Fatal

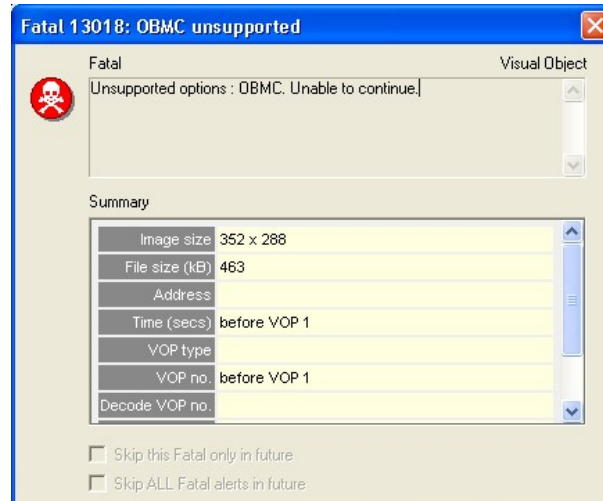
A Fatal error occurs when there is something encountered in the bitstream that cannot be decoded by SyncCert.

This selection cannot be turned off, and the decoder cannot continue after a Fatal error.

Fatal errors in SyncCert are commonly caused by:

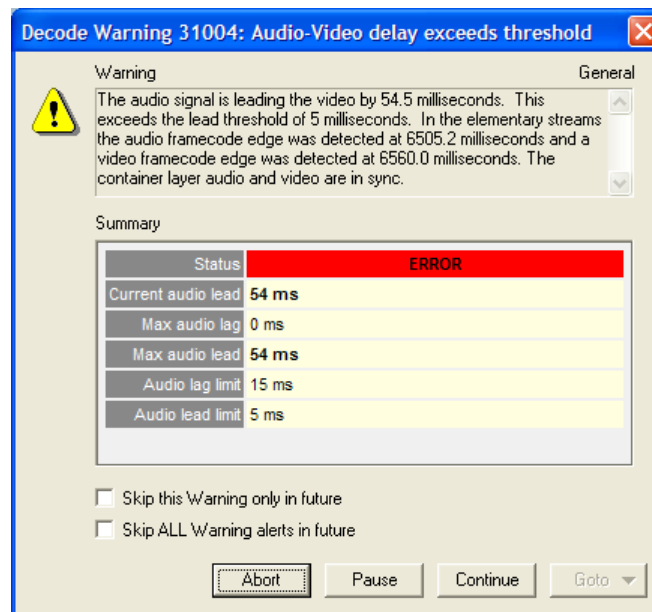
- Severe errors in the syntax of the bitstream, which make it completely unintelligible to SyncCert
- Options being selected in the video bitstream that are not yet supported by SyncCert

For example, the Fatal error illustrated below was caused by the OBMC flag in an MPEG-4 bitstream being set (on): the video bitstream in question is using overlapped block motion compensation. (OBMC = Overlapped Block Motion Compensation: although it is in the current MPEG-4 standard, none of the MPEG-4 profiles or levels defined currently support OBMC.)



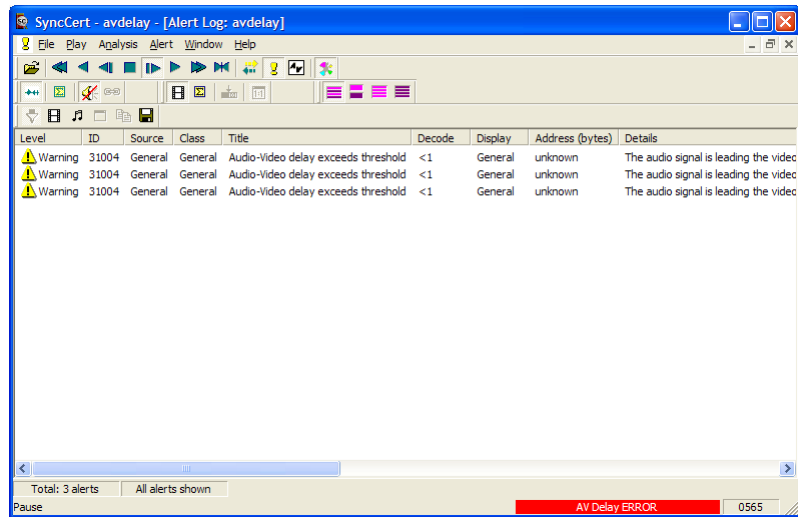
## Warning

When selected, this item will provide warnings that indicate behavior that is not correct, but does not necessarily damage the decoding of the bitstream.




## View Alert Log

The Alert log keeps a list of the popup alerts that have occurred during the decoding of the bitstream:





The Alert log window icons and column titles are as follows:

**Alert filter icon** . See *Showing/Hiding Alerts* on page 2-63

**Show/hide video alerts** 

**Show/hide audio alerts** 

**View alert details icon** . See *View details of the alerts* on page 2-63. If this icon is grayed out, it can be enabled by selecting any alert that is shown.

**Copy** . This icon becomes available only when an alert is highlighted. This function allows the selected alert to be copied to the Windows clipboard for pasting into any Windows application. Copying can also be done by pressing Ctrl+C.

**Level..** The error level: Fatal, Error, or Warning or Info.

**ID.** The unique ID number assigned to this error type within SyncCert.

**Class.** The area within the hierarchy of the compressed standard; see the screenshot above which shows an error in the Video Object Layer and seven warnings in the

---

Video Object Plane within the MPEG-4 bitstream. The classes vary with the video standards.

**Title.** The title assigned to this error type.

**Decode.** The number of the decoded frame in which this error was found.

---

**NOTE.** *If <1 is displayed, the error occurred before the decode of the first frame - the error occurred in the header.*

---

**Display.** The number of the displayed frame in which this error is shown.

---

**NOTE.** *If <1 is displayed, the error occurred before the decode of the first frame - the error occurred in the header.*

---

**Address (bytes).** The byte address in the bitstream where this error was found.

---

**NOTE.** *For video bitstreams that have been extracted from container files (for example, MP4 files, 3GPP files, MPEG-2 Packet Streams), this address is the byte address in the extracted video stream, not in the overall container file.*

---

**Details.** This is the description text that is shown when the popup alert is displayed.

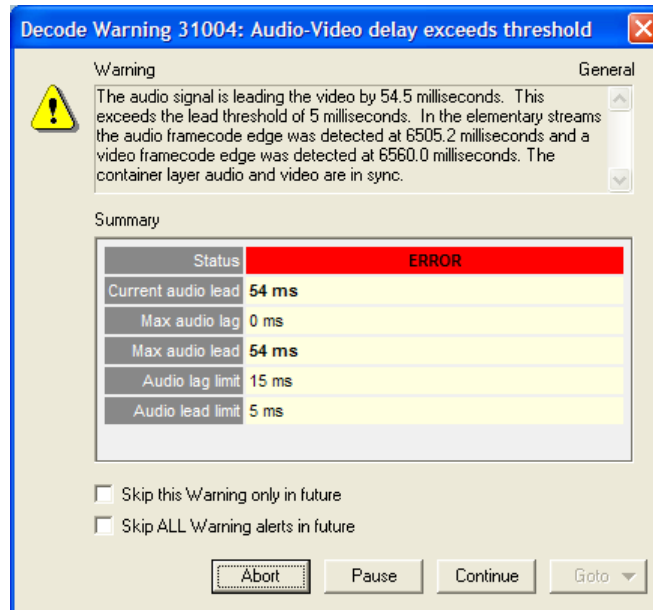
### Showing/Hiding Alerts

Alerts can be shown or hidden by pressing the  button.

**View details of the alerts.** This can be done in a number of ways:

- Double-click an alert in the Alert log window
- Select an alert by single-clicking an alert, and then clicking the icon

When this is done, a display very similar to the original popup alert display is shown:



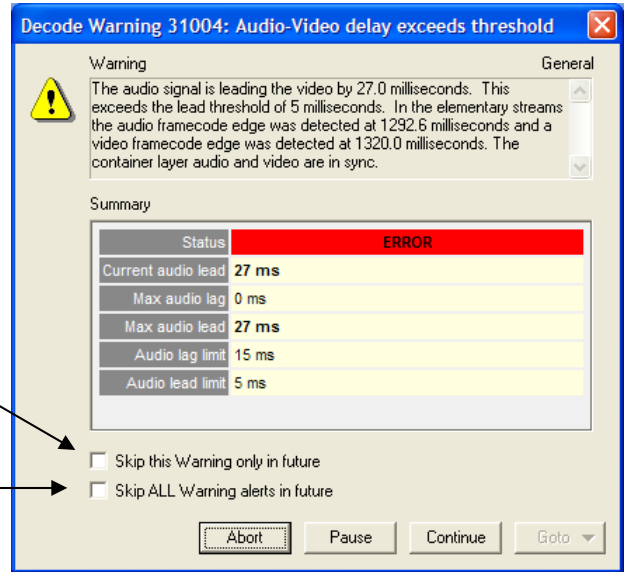
**Copy alert details to the Windows clipboard.** The details of an alert can be copied by highlighting the alert and using **Ctrl+C** or the copy icon.



**Check box options.**

Check this box to prevent seeing further alert(s) for this specific warning. Other Warnings and Fataals will still trigger an alert.

Check this box to prevent seeing further alert(s) for any alert level.

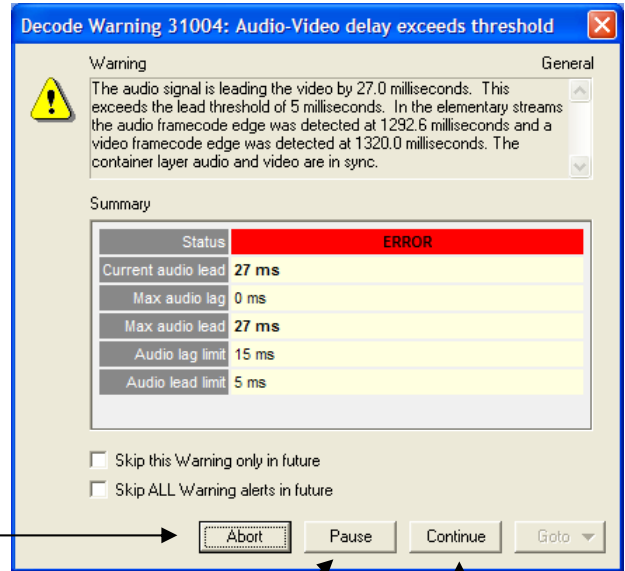


**Abort, Pause, Continue.**

Abort stops the decoding immediately; at the end of the current alert, leaving the stream in Stop mode.

Pause keeps decoding to the end of the current frame/VOP; thereafter the stream enters Stop mode.

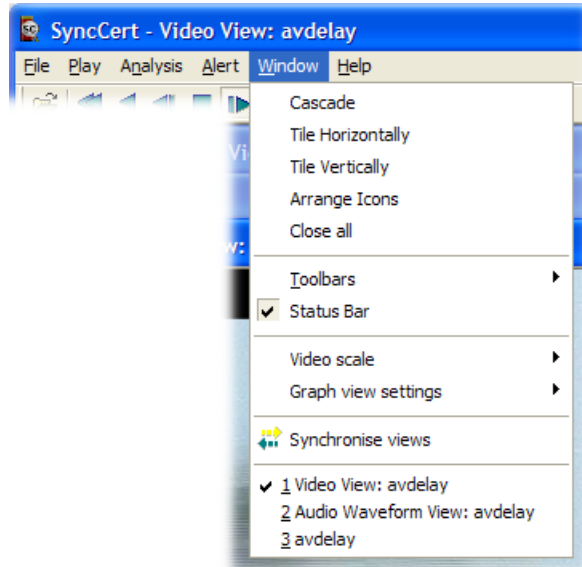
Continue decoding (in normal/fast/step modes).



**NOTE.** Abort can also be requested by pressing the Esc key.



# Window Menu



The commands on this menu are typical of a standard Windows application, such as arranging windows; list of open windows.

## Quickly Switch Windows

Pressing **Ctrl+Tab** together displays a list of open SyncCert windows:

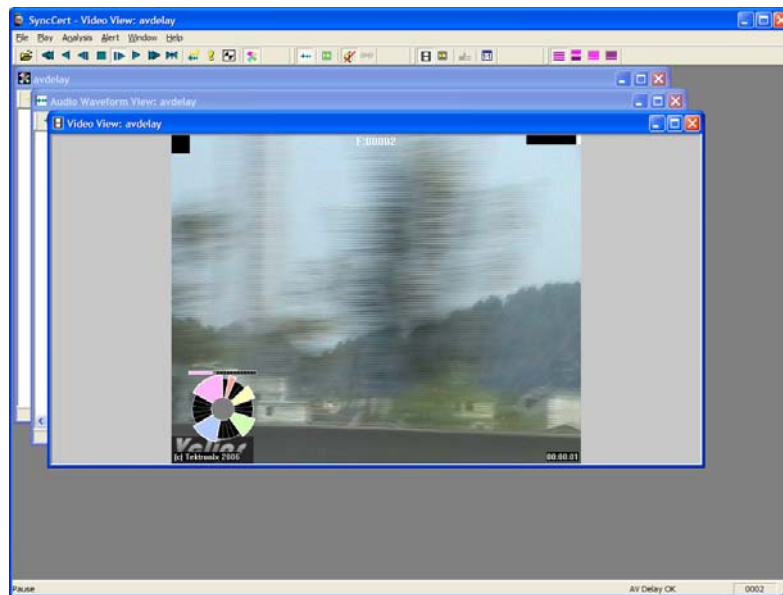


Repeatedly pressing **Ctrl+Tab** steps through all the open windows. Alternatively, the mouse can be used to select a window.

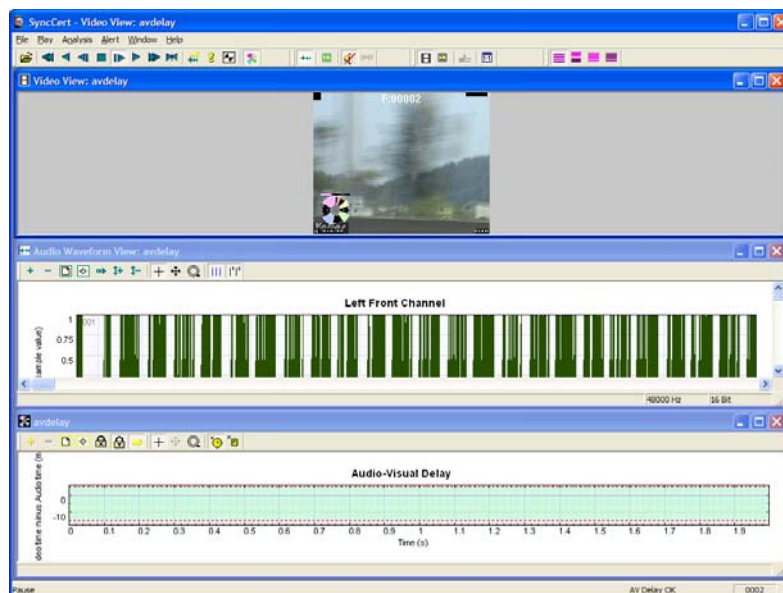
## Cascade, Tile, Arrange Icons, Close All

These function as per standard Windows commands:

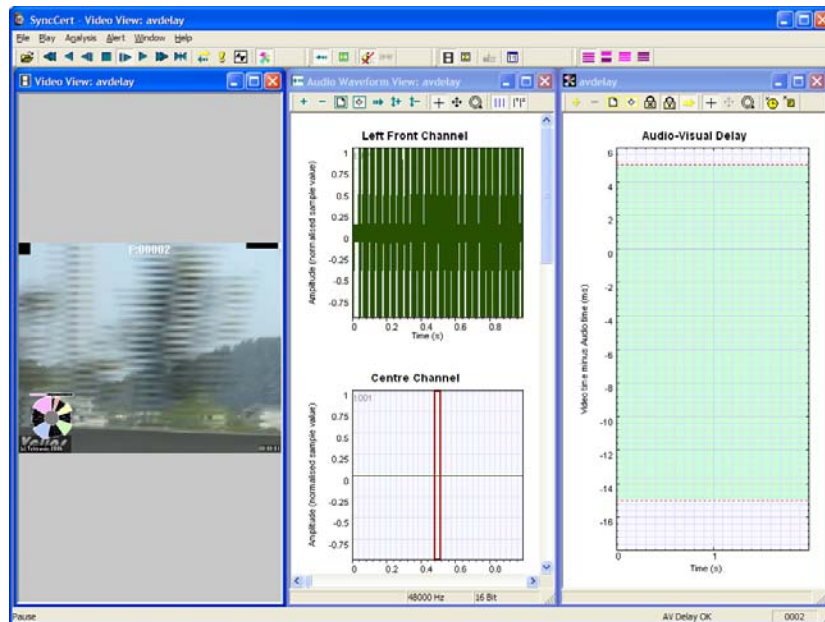
- Cascade arranges the open windows in a cascade:



- Tile Horizontally arranges the open windows as shown:



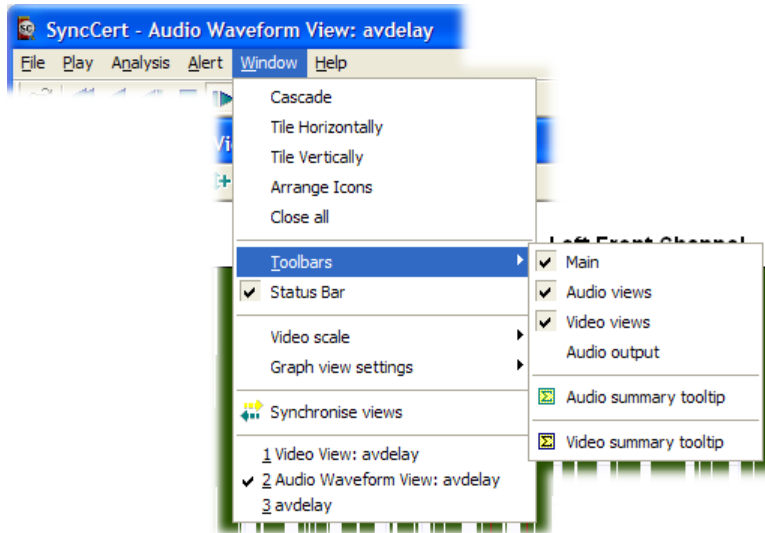
- Tile Vertically arranges the open windows as shown:



- Arrange Icons lines up the windows when they are minimized
- Close all closes all windows in SyncCert

## Toolbars

The available toolbars can be displayed by selecting them from the Window > Toolbars menu. A displayed toolbar is indicated by a check mark in the Window menu. Toolbar buttons may be grayed out when a function is inactive.

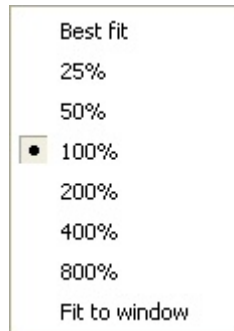


## Status Bar

When selected (which is the default setting), the Status Bar is displayed at the bottom of the window. When not selected, it is hidden.

See *Status Bar* on page 2-78 for more information.

## Video Scale



This sets the size that the decoded video appears in the video window.

### Best Fit

This zooms the displayed video as far as is possible within the video window, while still maintaining the original aspect ratio of decoded video.

### 50%; 100% ( 1:1); 200%; 400%; 800%

These set the displayed video to the selected size in the video window.

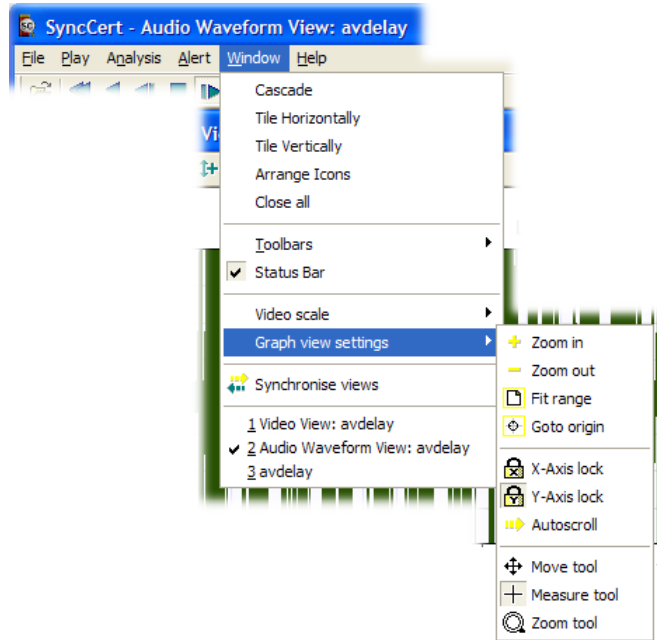
If the selected size is larger than the available window area, then a section of the video window will be displayed, with scroll bars:

When SyncCert starts, it is set by default to 100% or 1:1; the video displays at its actual size with one screen pixel equaling one pixel in the displayed video.

### Fit to Window

This zooms the displayed video to completely fill the video window; it does not maintain the original aspect ratio of decoded video.

## Graph View Settings



The Graph view menu controls how the data appears in any graphical display (Audio Waveform and A/V Delay views). These options are described in the following table:

Icon	Equivalent toolbar icon	Function
Zoom-in		Zoom in (centered on current window)
Zoom-out		Zoom out (centered on current window)
Fit to range		Fit all data into the visible window
Goto origin		Go to the origin (time = 0)
X-Axis lock		Lock the X-axis when zooming/scrolling
Y-Axis lock		Lock the Y-axis when zooming/scrolling
Autoscroll		Autoscroll to follow frames as decoded
Move tool		Move window left/right/up/down
Measure tool		Measure the values at the center point of +
Zoom tool		Zoom in/out, centered on the cursor
Goto view	n/a	See <i>Synchronized Views/Navigating the Views</i> on page 2-7
Synchronise views	n/a	



## Synchronize views

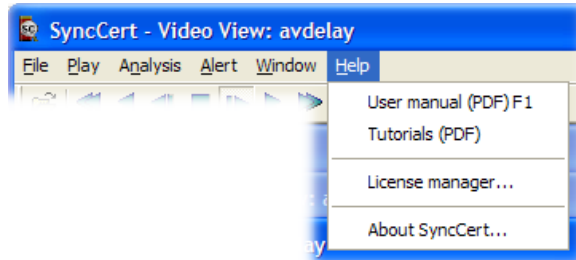
When Window > Synchronise Views () is selected, all open windows synchronize automatically.

## Active Views

A list of all of the open views is displayed at the bottom of the Windows menu. A check mark appears next to the currently selected view. Highlight and select an entry to change the selection.



# Help Menu



This menu provides access to the Help information (on-line, PDF), the tutorials, configuration information, and license information (including licensed options).

## User manual (PDF)

This displays a PDF version of this user manual.

See the Adobe Acrobat documentation for details about how to navigate through these views.

## Tutorials (PDF)

This displays a PDF version of the tutorials on how to optimize your use of SyncCert. It is strongly recommended that you work through the tutorials.

## License manager...

This displays the SyncCert License manager, including:

- Current license status information
- Other possible options that can be licensed
- Option to update the license key

## About SyncCert...

This displays the exact version number of SyncCert and the copyright message, and allows access to the SyncCert build options.

## Icon Toolbars

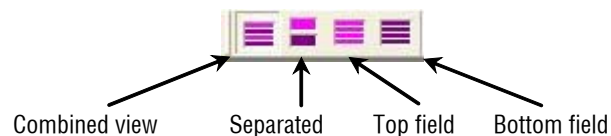
These toolbars provide quick selection of some of the commonly used functions. Toolbars can be individually moved and docked.

When a toolbar icon looks as though it is pressed in, it is active (selected). At various times, some of the toolbar buttons are grayed out, indicating that they are disabled because that function cannot be active at the time.

Toolbars can be displayed or hidden using the check boxes in Window > Toolbars submenu.

The toolbar icons used on the Main, Audio, and Video toolbars are described elsewhere in this manual. The Interlace toolbar is described in the following paragraphs.

### Interlace Toolbar



Only one of these four buttons is pushed in (active) at any time.

---

**NOTE.** *The Interlace toolbar only appears when a bitstream could have Interlace within it. The fact that the Interlace toolbar is there does not necessarily mean that the bitstream is interlaced – only that interlace is permissible/possible in the given standard, Profile and Level.*

---

These are examples of video streams where the Interlace toolbar can appear (this is not a complete list):

- H.264/AVC (All supported profiles)
- VC-1 Advanced profile
- MPEG-4 Advanced simple profile, levels 4 and 5
- MPEG-2 Main profile, Main level

---

**NOTE.** When the Interlace toolbar has not been automatically displayed by SyncCert (or it has been closed), it can be displayed by clicking the Windows menu, and then selecting Toolbars, Interlace.

---

**Combined frame view.** Both fields are shown together, as a single image:

---

**NOTE.** Some data and functions are not available when the video is displayed in this view. For example, the MacroBlock tooltip is empty and cannot be used, and motion vectors, MacroBlock Types, and other overlaid data do not appear.

---

**Separated fields view.** The top and bottom fields are shown separately, one above the other:



**Top-field view.** Only the top-field image data is displayed. For field coded MacroBlocks, the MB tooltip and overlays show data relevant to the top field. For frame coded MacroBlocks, the MB tooltip and overlays show data relevant to the frame.

Each row is shown twice (duplicated) to produce an image to the full image height:



**Bottom-field view.** As above but for bottom field.

### **Moving/Docking**

Toolbars are docked at the top of the window below the menu bar by default. Any menu can be dragged from this position to be floating or be docked on any of the other three edges of the main window, by clicking and dragging the narrow vertical line at the left edge of the toolbar.

## **Status Bar**











The status bar provides:

- A one-sentence description of each menu item, as the mouse is moved over the menu item
- The stream Play mode (see *Playing Mode: Restrictions* on page 2-6)
- Context-sensitive information. The information displayed depends on which window type is open and the current status of the file within that window

The status bar can be displayed or hidden from the Window menu.

## Ctrl Shortcut Keys

All shortcut keys are accessed by holding the Ctrl key and pressing the letter given in the following table.

Toolbar icon	Ctrl +	Name	Description	Page (Section 6)
	mouse	Force undock	Force undocking of tooltip (for example, Summary/MacroBlock)	-
	1	1:1	Set video scale: Best fit or 1:1	2-71
	A	Pause/Step forward	Pause a video file/advance by one frame	2-36
	Shift + A	Pause/Step backward	Pause a video file/ step back by one frame	2-37
	C	Copy	Copy highlighted selection	2-64
	F	Fast forward	Fast forward a video file	2-35
	Shift + F	Fast backward	Fast backward a video file	2-36
	O	Open stream...	Open a video/audio file	2-4 and 2-13
	P	Play forward	Play a video/audio file (forwards)	2-34
	Shift + P	Play backward	Play a video file backwards	2-34
	S	Stop	Stop playing a video/audio file	2-36
	U	Summary tooltip	Open/close the Audio/Video summary tooltip	2-47
	Tab	Switch windows	Quickly switch between open windows	2-67

## Alt Menu Keys

Menus can be selected by pressing the Alt key and the letter underlined in the menu option name. For example, pressing Alt+f will open the File menu. The cursor keys (or the mouse) can be used to select the option required.







# **Command Line / Batch Mode**



# Command Line/Batch Mode

This feature allows SyncCert to be run in one of two ways:

- Command line mode
- Batch mode

## Command line mode

In command line mode, SyncCert opens with the Windows display as usual, but using the files and flags specified in the command line.

## Batch mode

In batch mode, there is no Windows display (the window is actually minimized and not activated) and the input file, flags and output files are specified in the command line.

The exception to this in batch mode is when no input file is specified. In this case, SyncCert opens in Windows mode, allows you to specify a bitstream file name, and then closes Windows mode and goes back to batch mode.

SyncCert exits automatically from batch mode when the last selected frame has been decoded.

---

**NOTE.** Remember the *-b* option to run SyncCert in batch mode (rather than *command-line mode*).

---

## Running SyncCert in command line/batch mode

To use command line or batch mode:

- Use Windows Start/Run and type in the line
- Open a command prompt window (typically from Windows Start/Programs/Accessories) and enter the line

The format of the line to be entered is:

SyncCert [options...] <filename> where:

- [options...] is zero or more of the options listed in 0
- <filename> is the input video file to be decoded

**Specification of Filename (input video file)**

The input video filename must be the full filename (including any file extension after the . [period]).

**Using demonstration sequences in batch mode.** To use batch mode with the demonstration tutorial video sequences provided on the File menu, the filename for these sequences is specified below:

Demo sequence	Standard	Filename
<b>A/V Delay Stream</b>		
Delay	MPEG-2 Main Profile / Main Level (video)	avdelay
No Delay	Dolby AC-3 (audio)	avdelay_2

To use these demonstration sequences, the option -d is used: see *List of options* on page 3-2.

**Command Line/Batch Mode Options**

**Form of options.** All options take the following form:

-x <value>

(Where x is the option and <value> is the value entered; for some options there is no value.)

---

**NOTE.** All options must be entered in lower case.

If there is a value, there is always a <space> between the -x and the value.

All options must be separated by spaces.

---

**NOTE.** Where filenames or folders have spaces in the path or name, these must be put inside double quotes.

There is limited checking on the options/option values.

**List of options.**

Option	Value (if any)	Description
--------	----------------	-------------

Option	Value (if any)	Description
-b		When present, enable batch mode. If not present, command line mode is used.
-d		Access demonstration stream. (The filename is given at the end of the command line.)
-h		Show this help message.
-i	<trackID>	Where the input file is a container file such as MP4 or 3GPP or MPEG-2 Program Stream, there can be more than one video track in the file. If -i is not specified then the first video track found is used. If the track ID specified is not present, a file missing error is given.
-j	<trackID>	Where the input file is a container file such as MP4 or 3GPP or MPEG-2 Program Stream, there can be more than one audio track in the file. If -j is not specified then the first audio track found is used. If the track ID specified is not present, a file missing error is given.
-s	<file>	A/V Sync output file.
-w	<error_file>	<error_file> is the name of the file that holds the warnings/errors/fatal alerts. If there are no warnings/errors/fatal alerts, the <error_file> is zero length

### Example Command Line

An example of a valid command line is:

```
synccert -b "d:\test\file.mpg" -w error.txt
```

Refer to the previous table for an explanation of the options used in this example.





# Index





# Index

## 3

### 3GPP files, 1-24

- close video after opening, 2-29
- opening video files, 2-17
- tracks within, 2-17

## A

### A/V Delay

- view, 2-5

### A/V Delay stream

- example files, 2-29

### Alert log

- address, 2-63
- class, 2-62
- decode frame number, 2-63
- details, 2-63
- display frame number, 2-63
- filter icon, 2-62
- icons & column titles, 2-62
- ID number, 2-62
- level, 2-62
- seeing details of alerts, 2-63
- showing/hiding, 2-63
- title, 2-63
- view, 2-62
- view alerts icon, 2-62

### Alerts

- alert log, 2-62
- copy to clipboard, 2-64
- fatal, 2-60
- levels, 2-59
- warning, 2-61

### Alerts menu, 2-59

### Alt menu keys

- activating, 2-77

### analysis

- menu, 2-47

### ASF files

- close video after opening, 2-29

- format, 1-17

- opening video files, 2-17

- tracks within, 2-17

## Audio

- Audio waveform view, 2-8

- toolbar icons, 2-10

- audio-video synchronization, 2-34

- file formats, 1-24

- mute, 2-45

- standards references, 1-26

- standards supported, 1-15

- synchronize audio, 2-46

## Audio files

- opening

- elementary streams, 2-16

## B

### Batch mode, 3-1

- introduction, 3-1

- options, 3-2

- use of example sequences, 3-2

- use of YUV example sequences, 3-2

## C

### Command line mode

- example, 3-3

- introduction, 3-1

- options, 3-2

- running, 3-1

### Ctrl keys

- Ctrl+Tab to switch windows, 2-66

- list, 2-77

## D

### Decoder cache, 2-38

### Decoder options

- audio, 2-44

- General, 2-38

- H.263, 2-39
- H.264/AVC, 2-39
  - step-back buffer, 2-38
  - uncompressed video, 2-40
  - video, 2-38
- DVD, 1-18

## E

- Environmental Considerations, v
- Error resilience
  - data partitioning, 1-11
  - resync markers, 1-11
  - reversible VLC, 1-11
- Example files, 2-29
  - A/V Delay streams, 2-29
  - use in batch mode, 3-2

## F

- Fast backward, 2-36
- Fast forward, 2-35
- File formats
  - 3GPP container files, 1-17
  - 3GPP files, 1-24
  - ASF container files, 1-17
  - audio, 1-24
  - H.263, 1-22
  - MP4 container files, 1-17, 1-25
  - MPEG-2
    - PES files, 1-24
    - Program Stream files, 1-24
    - Transport Stream files, 1-24
  - MPEG-2 DVD, 1-18
  - MPEG-2 PES, 1-18
  - MPEG-2 Program Stream, 1-18
  - MPEG-2 Transport Streams, 1-18
  - MPEG-2 VOB, 1-18
  - RCV files, 1-17
  - video, 1-17
- File menu, 2-13

## G

- Global Motion Compensation, See GMC
- GMC

- support for, 1-11

## H

- H.263
  - decoder options, 2-39
  - file format, 1-22
  - standards supported, 1-14
- H.264/AVC
  - Baseline Profile, 1-9
  - cropping rectangle, 2-48
  - decoder options, 2-39
  - Extended Profile, 1-9
  - FRExt, 1-9
  - High Profile, 1-9
  - Main Profile, 1-9
  - Profiles and Levels, 1-8
  - tools, 1-9
  - video Byte Stream format, 1-20
- Help
  - license manager, 2-73
  - PDF tutorials, 2-73
  - PDF user manual, 2-73
- Help menu, 2-73
- HexView
  - settings in Window menu, 2-71

## I

- Icons
  - Audio waveform view, 2-10
  - synchronize views, 2-7
- Interlace
  - bottom field view, 2-76
  - combined (frame) view, 2-75
  - separated (fields) view, 2-75
  - toolbar, 2-74
  - top field view, 2-75

## M

- menu
  - analysis, 2-47
- MP4 file format
  - close video after opening, 2-29
  - opening video files, 2-17

- tracks within, 2-17
  - MP4 files, 1-25
  - MPEG-2
    - B-frames, 1-13
    - DVD, 1-18
    - Main Profile, 1-13
    - opening VOBs, 2-23
    - PES, 1-18
    - Profiles & Levels, 1-13
    - Tools, 1-13
    - Transport Stream file format, 1-18
    - VOB, 1-18
  - MPEG-2 PES files, 1-24
  - MPEG-2 Program Stream files, 1-24
  - MPEG-2 Program Streams
    - close video after opening, 2-29
    - opening video files, 2-17
    - tracks within, 2-17
  - MPEG-2 Transport Stream files, 1-24
  - MPEG-2 Transport Streams
    - opening video files, 2-17
    - tracks within, 2-17
  - MPEG-4
    - Advanced Simple Profile, 1-11
    - B-VOPs, 1-11
    - error resilience, 1-11
      - data partitioning, 1-11
      - resync markers, 1-11
      - reversible VLC, 1-11
    - GMC, 1-11
    - MP4 container file format, 1-17
    - Profiles & Levels, 1-10
    - QuarterSample, 1-11
    - Simple Profile, 1-11
    - Tools, 1-11
    - video Elementary Stream format, 1-21, 1-22
- P**
- PAL/NTSC
    - analysis, 1-23
  - Pause
    - advance/Step frame-by-frame, 2-36
    - on a specific frame, 2-37
    - step backwards frame-by-frame, 2-37
- PES**
- MPEG-2, 1-18
- Play**
- audio decoder options, 2-44
  - continuous, 2-37
  - fast backward, 2-36
  - fast forward, 2-35
  - pause on frame, 2-37
  - step backward, 2-37
  - step forward, 2-36
  - stop, 2-36
  - video decoder options, 2-38
- Play menu, 2-33**
- Playing video**
- buffering delay, 2-34
  - continuously in a loop, 2-37
  - go to a specific frame, 2-37
  - mode restrictions, 2-6
  - single-step frame-by-frame, 2-36
  - single-step frame-by-frame backwards, 2-37
- preferences, 2-29**
- Program Stream**
- MPEG-2, 1-18
- Q**
- QuarterSample**
- support in MPEG-4, 1-11
- R**
- recent file list, 2-32
  - Right-click pop-up menu
    - video navigator, 2-57
- S**
- Shortcut keys**
- Alt menu, 2-77
  - Ctrl, 2-77
  - Ctrl+Tab to switch windows, 2-66
- Standards**
- MPEG-1 Part 3 audio, 1-15
  - MPEG-2 Part 3 audio, 1-16

- MPEG-2 Part 7 audio, 1-16
- MPEG-4 Part 3 ADTS, 1-16
- MPEG-4 Part 3 audio, 1-16
- supported
  - audio, 1-15
  - H.263, 1-14
  - H.264/AVC, 1-8
  - MPEG-2, 1-13
  - MPEG-4, 1-10
  - VC-1, 1-10
  - video, 1-7
- Standards references, 1-26
  - 3GPP, 1-26
  - H.263+, 1-26
  - H.264/AVC, 1-26
  - HE AAC codecs, 1-26
  - MP4, 1-26
  - MPEG-1 audio, 1-26
  - MPEG-2, 1-26
  - MPEG-2 AAC, 1-26
  - MPEG-2 audio, 1-26
  - MPEG-4, 1-26
  - MPEG-4 AAC, 1-26
  - VC-1, 1-26
- Status bar
  - overview, 2-76
- Step
  - backward, 2-37
  - forward, 2-36
- Step-back buffer
  - decoder options, 2-38
- Stop, 2-36
- Summary tooltip
  - examples for different video standards, 2-47
  - Final Summary (end of sequence), 2-49
  - introduction, 2-47
- SyncCert
  - starting to use, 2-3
- Synchronized views
  - icon, 2-7
  - introduction, 2-7

## T

### Toolbar

- Audio waveform view, 2-10
- Interlace, 2-74
- moving & docking, 2-76

### Tooltips

- force un-docking, 2-52
- mmanipulation, 2-51
- Summary, 2-47

### Tutorials

- PDF (Help menu), 2-73

## U

### Uncompressed video

- decoder options, 2-40
- opening video files, 2-23

## V

### VC-1

- close video after opening, 2-29
- opening video files, 2-17
- Profiles & Levels, 1-10
- tracks within, 2-17
- video Elementary Stream format, 1-21

### Video

- standards references, 1-26

### Video files

- example files, 2-29
- opening, 2-13
  - ASF files, 2-17
  - elementary streams, 2-16
  - greyscale format, 2-23
  - MP4 container files, 2-17
  - MPEG-2 Program Streams, 2-17
  - MPEG-2 Transport Streams, 2-17
  - MPEG-2 VOBs, 2-23
  - RGB format, 2-23
  - uncompressed video files, 2-23
  - VC-1 files, 2-17
  - YUV format, 2-23

### Video navigator

- detail view, 2-56
- right-click pop-up menu, 2-57

- 
- thumbnail view, 2-55
  - Video window
    - best fit, 2-70
    - fit to window, 2-70
    - zooming in, 2-70
  - View
    - alert log, 2-62
  - VOB files, 1-18
    - opening, 2-23
  - W**
  - Waveform
    - audio, 2-8
  - Window
    - quickly switch, 2-66
  - window elements, 2-2
  - Window elements
    - controlling windows, 2-66
    - manipulating tooltips, 2-51
    - status bar, 2-76
  - Window menu
    - commands, 2-66
    - video scale, 2-70
  - WMV9 files
    - Advanced Profile video ES format, 1-21
    - Profiles & Levels, 1-10
  - Y**
  - YUV
    - format, 2-23
  - Z**
  - Zoom
    - video window, 2-70

