AVT Direct Stream Package

User Guide

V2.1.0

10 June 2011

///ALLIED
Vision Technologies

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Allied Vision Technologies GmbH 06/2011

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Introduction

The **AVT Direct Stream Package** is a Software Development Kit (SDK) that focuses on DirectShow and COM based programming. Thereby, the provided DirectShow compliant streaming driver allows also using AVT 1394 cameras with many DirectShow compliant image processing solutions.

The additionally provided AMCap-based viewer sample allows customers to test and evaluate AVT 1394 cameras with streaming applications. This included viewer sample is a ready-for-use example program provided as C++ source code. Based on this sample code, customers can write their own DirectShow based applications. With **AVT Direct Stream Package**, your application immediately supports AVT's 1394a and 1394b digital cameras.

Advantages
- FireWire according IEEE1394a/b up to 800 Mbit/s supported, depending on your Windows version
- Easy integration of AVT 1394 cameras into 3rd-party software solutions based on DirectShow.
- COM-based programming interface to support languages like C, C++, and C# (.net).

Restrictions
- Support for 32- and 64-bit Windows operating systems.
- Chapter *Redistribution* on page 70 gives you information on restrictions concerning redistribution.

Note

AVT Direct Stream Package is the successor of the **AVT Direct FirePackage**.

Document history

Version	Date	Remarks
V2.0.0	23.02.10	New manual 32-bit version **AVT Direct Stream Package** RELEASE status
V2.0.1	19.07.10	Due to costumer problems hot-plugging a 1394 camera, added second and third **FireWire hot plug precautions, not to hotplug a 1394 camera:** See the following additional safety instructions: • *Caution* on page 13 and • *Caution* on page 19. Added step by step instructions to shut down the system, before connecting a 1394 camera: • See step *2. Shut down your system.* on page 13. • See step *17. Shut down your system.* on page 22.
V2.1.0	10 June 2011	**New file format:** • Changed file format from FM7 to FM9 **Added descriptions for 64-bit installations:** • Chapter *Operating system requirements* on page 10 • New screenshots due to new icons in Chapter *Installing AVT Direct Stream Package* on page 13ff. • Added Info how to register DLL under 64-bit systems: see Chapter *Mandatory requirements* on page 70 **Windows Vista not supported, but again supported but not tested yet (please read Release Notes for latest status)/ 64 bit only Windows 7:** • All chapters. **Updated to new icons:** • New icons for the DSP 1394 Driver Installer in Chapter *Installing AVT Direct Stream Package* on page 13ff. • New icons for the AVT AMCap in *Figure 10: AVT Direct Stream Package setup: Desktop icons* on page 20 **Added new features:** • Added description of new **LUT** tab in Chapter *LUT tab (AVT)* on page 59 • Handling of **Smart Feat. 1** tab changed, see Chapter *Smart Feature 1 tab (AVT)* on page 61

Table 1: Document history

Manual overview

The manual overview briefly describes each chapter of this manual.

- Chapter *System requirements* on page 9 lists conditions for hardware, operating system and software.
  - **Read the Chapter *Special advice when working with Windows Vista / Windows 7* on page 10.**
- Chapter *Package installation* on page 12 describes how to install **AVT Direct Stream Package**. You can install the necessary drivers automatically or manually.
- Chapter *Components overview* on page 29 describes the SDK components of **AVT Direct Stream Package**.
- Chapter *Package architecture* on page 31 gives you an overview of the package architecture.
- Chapter *Quick start for programmers* on page 32 provides a tutorial, in which you learn step by step how to create your own project. A viewer sample in C++ code is provided, with which you can immediately test the AVT camera and acquire your first images.
  - **Read the explanations to the User Account Control (UAC) very carefully before starting any project.**
  - **For users who want to program their own applications: Read the *AVT Direct Stream Property Set Documentation* which is also provided as help file (*AVT1394DirectStreamProperty.chm*). After installation you find this help file under:**

```
C:\Program Files\Allied Vision Technologies\DirectStreamPackage\Doc
```

- Chapter *Redistribution* on page 70 describes redistribution procedures for **AVT Direct Stream Package**.

Conventions used in this manual

To give this manual an easily understandable layout and to emphasize important information, the following typographical styles and symbols are used:

Styles

Style	Function	Example
Bold	Programs, inputs or highlighting important things	**bold**
Courier	Code listings etc.	Input
Upper case	Register	REGISTER

Table 2: Styles

Style	Function	Example
Italics	Modes, fields	*Mode*
Parentheses and/or blue	Links	(Link)

Table 2: Styles

Symbols

Note   This symbol highlights important information.

Caution   This symbol highlights important instructions. You have to follow these instructions to avoid malfunctions.

www   This symbol highlights URLs for further information. The URL itself is shown in blue.

Example:

http://www.alliedvisiontec.com

Before operation

Target group   This **User Guide** supports you with detailed technical information about the software and **is mainly written for experts**. We expect a deep knowledge of the Microsoft operating systems and their underlying techniques on a programmer's level. You should also have a deep knowledge of DirectShow and Windows SDK.

The **AVT Direct Stream Package User Guide** describes the installation of the **AVT Direct Stream Package** and gives also a quick start for programmers.

The following two chapters are for readers using DirectShow-based applications:
* Chapter *Package installation* on page 12ff.
* Chapter *Property pages: AVT-own tabs* on page 51ff.

System requirements

This chapter describes the requirements for installing **AVT Direct Stream Package**:

- Hardware requirements
- Operating system requirements
- Software requirements
- Special advice when working with Windows Vista / Windows 7 (UAC)

Hardware requirements

- PC or laptop with 1 GHz 32-bit or 64-bit (x86) processor or better and a minimum of 1 GByte RAM
- Use one of the following interfaces:
    - Built-in IEEE 1394 interface or
    - PC: IEEE 1394 adapter (OHCI) card (one or more) for PCI or PCI Express
    - Laptop: PCI Express bus or PC card or ExpressCard with IEEE 1394 port(s)
- One or more AVT 1394a or 1394b cameras connected to the system

Note

AVT offers a wide range of accessories (IEEE 1394 adapters, both 1394a or 1394b for different requirements).

FireWire hot plug precautions

Caution

Although FireWire devices can be hot-plugged without powering down equipment, **we recommend turning the computer power off, before connecting a 1394 digital camera to the system via a FireWire cable.**

If you hot-plug a 1394 digital camera, it may be damaged.

Operating system requirements

The **AVT Direct Stream Package** supports the following Windows operating systems:
- Windows 7 (32 bit and 64 bit)
- Windows Vista (32 bit only)
- Windows XP (32 bit only)

Software requirements

- **AVT Direct Stream Package installation file**
- For being able to compile the provided examples, you need Visual Studio 2005 or higher and a Platform SDK containing DirectShow and DirectX SDK.
- In order to use S800 speed with Windows Vista (or if you don't intend to apply the driver rollback in Windows XP), you need to install the bus driver from the **AVT 1394 Bus Driver Package** (For more information see **AVT 1394 Bus Driver Package User Guide**).

Note

The **AVT Direct Stream Package** includes a driver installation tool for analyzing your system and installing the suitable driver for your AVT camera.

Special advice when working with Windows Vista / Windows 7

This chapter gives you a short introduction to a new technology from Microsoft: the so-called **User Account Control**.

Basic information

User **A**ccount **C**ontrol (**UAC**) is a technology and security infrastructure for **Windows Vista / Windows 7** operating systems. It aims at improving the security of Windows by limiting application software to standard user privileges until an administrator authorizes an increase in privilege level. In this way, only applications that the user trusts receive higher privileges, and malware is kept from receiving the privileges necessary to compromise the operating system. So a user account may have administrator privileges assigned to it, but applications that the user runs do not have those privileges automatically unless the user explicitly authorizes them to have higher privileges.

Effects

Windows Vista / Windows 7 **U**ser **A**ccount **C**ontrol (**UAC**) prevents the compilation of example projects if those are opened directly from a location protected by UAC (i.e. C:\Program Files\...).

Therefore, to compile the **AVT Direct Stream Package** example projects under Windows 7, copy the project to a user-writable location as described in Chapter Workaround for UAC problems on page 68.

UAC warning   An example of an **UAC warning** when a program (e.g. the **AVT Direct Stream Package** 1394 Driver Installer *DSP1394DriverInstaller.exe*) wants to write in a system folder is the following:
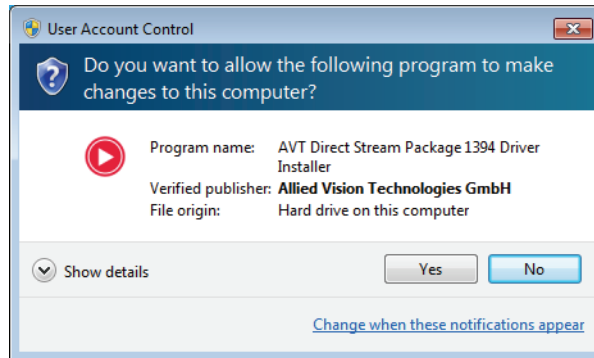
Figure 1: UAC warning: example

Perform the following steps:

1. In this case just click **Yes** because the shown program *DSP1394DriverInstaller.exe* is the driver installer of the **AVT Direct Stream Package** and needs to write certain files to the system folder for general use.

2. Go on working.

Note

You may prevent this UAC warning by right-clicking the **DSP1394DriverInstaller.exe** and select **Run as administrator** before you install the software.

Package installation

Overview

We assume that you have already installed the IEEE1394 interface card in your system. What happens when you do this is the following:

First of all Plug & Play will find the IEEE1394 interface card and starts searching for appropriate drivers. Normally the standard Microsoft driver for OHCI cards will be installed as well as a device driver if any device like a camera is already connected to the card. This device driver that is normally installed for a camera must be replaced by the **AVT Direct Stream Driver**.

After the IEEE1394 interface card installation is completed, you have to replace the default DCAM driver with the so-called **AVT Direct Stream Driver**.

You can do this in two ways:

- Using the **Driver Installation Utility** or
- Installing the driver **manually**

In any of the two cases you start with installation of the **AVT Direct Stream Package**. During this installation you can decide to install the driver automatically or install the driver later.

Note

If you have more than one FireWire card in your system and you want to use other FireWire devices, consider the following:

- If you use a different bus driver than the Microsoft bus driver in your system (like the **intek 1394 bus driver**), make sure to install the Microsoft bus driver on all 1394 cards where you connect a camera that you want to control via the **AVT Direct Stream Driver**.
- If you use the **intek 1394 bus driver** from earlier installations, this driver can live side by side with the Microsoft driver when multiple cards are present in your system.
- Warning: **intek 1394 bus driver** and MS 1394 card driver cannot be installed on the same interface simultaneously.

Installing AVT Direct Stream Package

Note   Screenshots in this chapter were done under Windows 7.

To install **AVT Direct Stream Package**, perform the following steps:

1. Close all open applications.

Caution   Although FireWire devices can be hot-plugged without power-
ing down equipment, **we recommend turning the computer
power off, before connecting a 1394 digital camera to the
system via a FireWire cable.**

If you hot-plug a 1394 digital camera, it may be damaged.

2. **Shut down your system.**

3. **Turn computer power off.**

4. Connect your camera to the 1394 (FireWire) port.

5. Turn computer power on.

6. Restart your system.

7. Download the **AVT Direct Stream Package** zip file from the AVT web site.
    Unpack it and start the corresponding *.exe.

    The **Windows Installer** box with a status bar will appear while setup pre-
    pares to start the installation process.

    Now you are ready to start installing **AVT Direct Stream Package**.
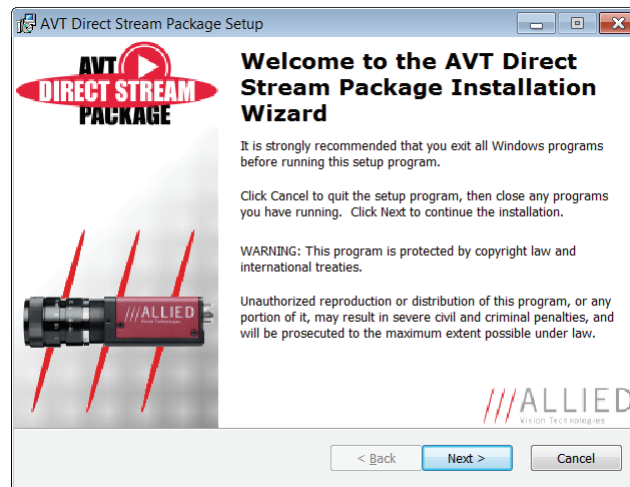
The **Welcome** dialog box will appear:

Figure 2: **AVT Direct Stream Package** setup: Welcome

8. Read the information in the **Welcome** dialog box.
   – If any programs are running on your system, click **Cancel** to quit the setup program, then close any programs you have running.
   – If you have already closed all your programs, click **Next** to continue the installation.

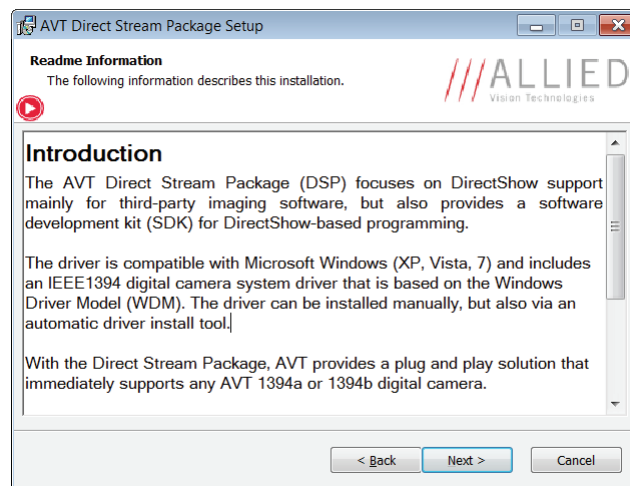   The **Readme Information** dialog box will appear:

Figure 3: **AVT Direct Stream Package** setup: Readme Information

9. Read the information displayed here carefully.
10. Click **Next** to proceed.

The **Choose Setup Type** dialog box will appear.
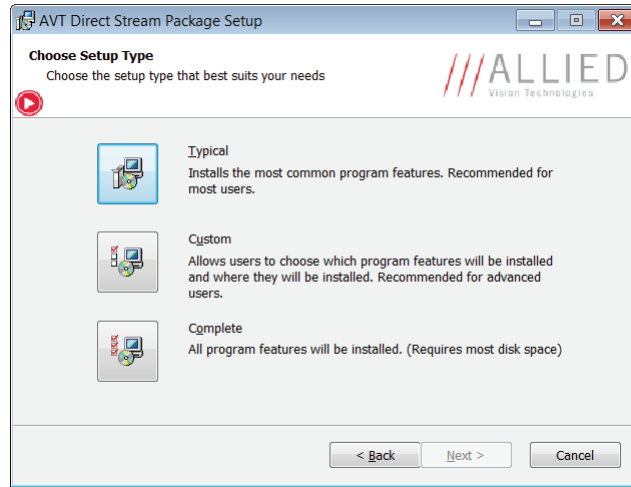
Figure 4: **AVT Direct Stream Package** setup: Choose Setup Type

11. Select the setup type by clicking on the corresponding icon: You can choose between **Typical**, **Custom** and **Complete**.

Setup type	Description
Typical	In most cases this will be the setup type **suitable for most users**. Compared to the **Complete** type this setup type does not install the Programming sample of the AVT AMCap viewer.

Table 3: Setup types

Setup type	Description	
Custom	**Note:** This setup type is recommended for **advanced users**.	
	If you click the **Custom** icon, the **Select Features** dialog box will appear: Here you can choose which components will be installed. Click on the icons to change current settings:	
	⊟ Will be installed on local hard drive ⊟品 Entire feature will be installed on local hard drive ✕ Entire feature will be unavailable	
	Click **Reset** to go back to standard settings.	
	Click **Disk Usage** to show available disk space on different volumes.	
	Base components	The **base components** are installed anyway.
	Programming examples	Choose to install **example applications** or not.
		Here the source files for example applications are installed, which show how to use various features of the **AVT Direct Stream Package**. For more information see Table 6: AVT Direct Stream Package example viewer project on page 30.
Complete	Installs all program features.	

Table 3: Setup types

The **Installation options** dialog box will appear:
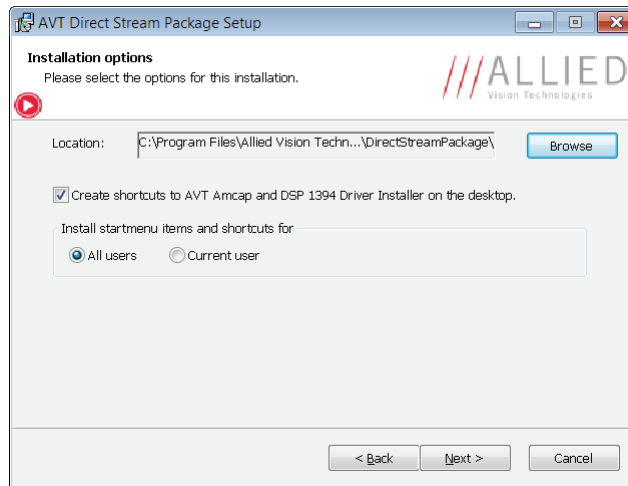
Figure 5: **AVT Direct Stream Package** setup: Installation options (Location)

The default location of **AVT Direct Stream Package** files is

```
C:\Program Files\Allied Vision Technologies\DirectStreamPackage
```

12. If you want to change the location, click **Browse**, enter drive and path for the desired folder and click **OK.** Furthermore you can set a few general **Installation Options**:

Check box / option	Description
Create shortcuts ... on the desktop.	When chosen: for **AVT AMCap** and **DSP 1394 Driver Installer** shortcuts on your desktop are created.
Install startmenu items and shortcuts for...	Choose an option to install the items/shortcuts for • All users • Current user

Table 4: **AVT Direct Stream Package** setup: Installation options (shortcuts/start menu items)

13. Click **Next** to proceed.

The following dialog will appear:
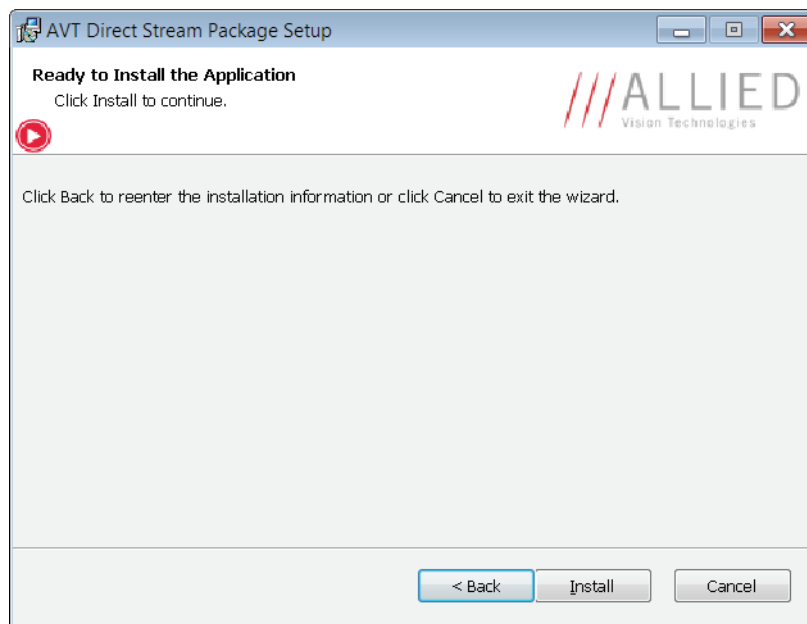
Figure 6: **AVT Direct Stream Package** setup: Ready to Install the Application

14. Click **Install.**

The following dialog will appear:
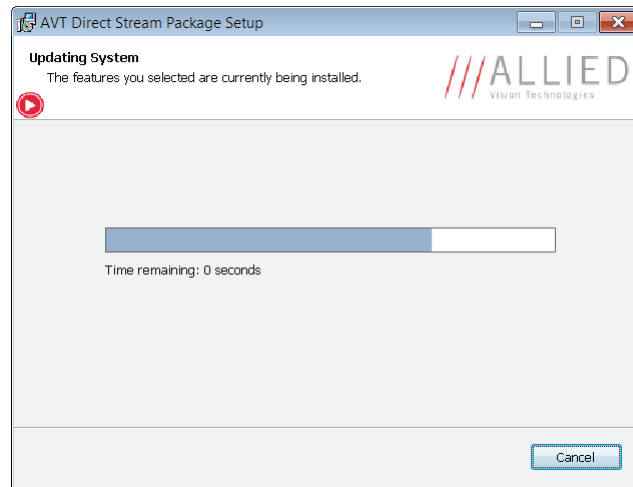

Figure 7: **AVT Direct Stream Package** setup: Updating System

AVT Direct Stream Package will be installed.

The following dialog will appear:

Caution   The following dialog may appear below the installer window.
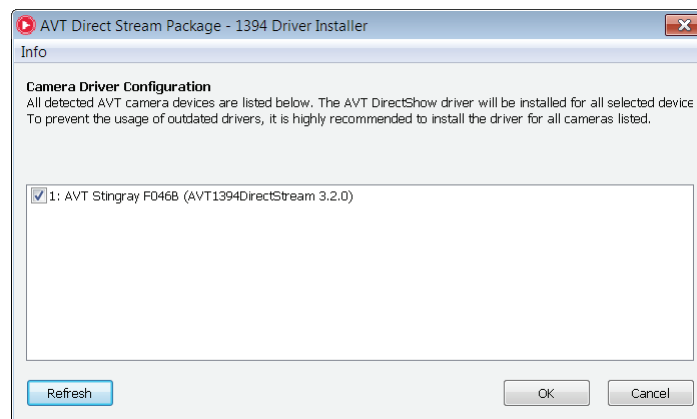
Figure 8: **AVT Direct Stream Package** setup: Camera Driver Configuration

Caution   **If you hot-plug a 1394 digital camera, it may be damaged.**

15. If you have not connected your camera to the 1394 (FireWire) port so far, **do not hot-plug your camera, because it may be damaged. In this case the driver can be installed as described in Chapter** *Driver management* on page 20**.**
    If you connected your camera before software installation, proceed with next step.

16. Click **Refresh** to update the AVT 1394 camera list.

    All detected AVT 1394 cameras are listed. Select the cameras for which the **AVT DirectShow driver** (AVT Direct Stream) should be installed.

    We recommend to install the driver for all cameras listed. This prevents the usage of outdated drivers.

    If you don't want that **AVT Direct Stream Driver** is installed for a device, uncheck the check box for that device.

Note   If you don't want to install the **AVT Direct Stream Driver** click **Cancel**.

    You can install this driver later. See Chapter *Driver management* on page 20ff.

17. Click **OK**.

    Once the installation is finished, the following dialog box will appear:

Figure 9: **AVT Direct Stream Package** setup: Successfully installed

18. Activate **Show Release Notes**, if you want to read the release notes with the latest information.

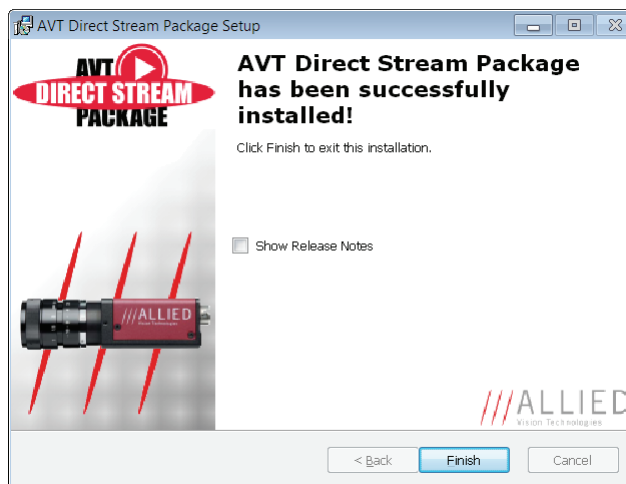19. Click **Finish** to exit the installer.

Note

Depending on your operating system you might need to reboot your system at this point. You will be prompted if a reboot is required; if a message appears, follow the on-screen instructions.

If you selected the **Create shortcuts ... on the desktop** check box, you will find the following icons on your desktop:

DSP 1394
DriverInstaller

AVT AMCap

Figure 10: **AVT Direct Stream Package** setup: Desktop icons

Driver management

If you have cancelled the DSP driver installation during package installation or if you want to use further (new) AVT 1394 cameras, you have the following two choices to install the appropriate driver:

• Using DSP 1394 Driver Installer (see Chapter *Using DSP 1394 Driver Installer* on page 20 and Chapter *Automatic driver setup* on page 20) or

• Installing driver manually (see Chapter *Manual driver setup* on page 24)

Using DSP 1394 Driver Installer

AVT Direct Stream Package provides a special driver installation utility. To start this **DSP 1394 Driver Installer** see Chapter *Starting DSP 1394 Driver Installer* on page 21.

Automatic driver setup

This package includes the **DSP 1394 Driver Installer** for an easy configuration of 1394 host controllers and AVT 1394 cameras.

The automatic driver setup consists of two phases:

• Phase 1 (only under XP): Host controller configuration

• Phase 2: AVT camera configuration

Technological background: Host controller configuration

Host controller driver configuration could be useful for two reasons:
- compatibility and
- performance

Compatibility may be an issue, as there are commercially available bus drivers exposing proprietary driver interfaces, which are not supported by the **AVT Direct Stream Package**.

The camera driver (DirectShow capture source) provided with the **AVT Direct Stream Package** is a WDM streaming driver that controls the processing and transport of AVT 1394 camera streaming data at operating system level (kernel mode) and is intended to be used with the standard Microsoft bus driver. Additionally, the capture source is compatible with the AVT 1394 bus driver provided with the **AVT 1394 Bus Driver Package**.

This camera driver may, however, also work with third-party bus drivers exposing a compatible interface.

If you want to use the **AVT 1394 Bus Driver Package**, you have two choices:
- Install the driver provided with the package before calling the Driver Installation Tool or
- Exchange the bus driver after calling the Driver Installation Tool.

The result is the same: you are able to use S800 speed for 1394b cameras like the Stingray, Pike or Guppy PRO cameras.

Additionally, on **Windows XP** systems with Service Pack 2 or greater, and on **Windows Vista** systems (but not on Windows 7 systems), changes may be needed to obtain the full data rate of 1394b adapters. On these systems, data rates exceeding the limits of 1394a are not supported officially. To circumvent this limitation, a downgrade to Service Pack 1 drivers may be performed. This unofficial workaround modifies important Windows system files and is not endorsed by Microsoft.

Note

(i)

- Before performing this downgrade, a full system backup is highly recommended
- This downgrade is only supported for **Windows XP (32-bit)** systems.

Starting DSP 1394 Driver Installer

Perform the following steps:

1. Start **DSP 1394 Driver Installer**.

   You have two choices to open the **DSP 1394 Driver Installer**:

– **First choice:** Double-click icon on desktop:

DSP 1394
DriverInstaller

Note

This is only possible if you activated **Create shortcuts … on the desktop** check box during the installation process.

– **Second choice:**
Start → All Programs → Allied Vision Technologies → DirectStreamPackage → DSP 1394 Driver Installer

At startup, the **DSP 1394 Driver Installer** determines the configuration of existing 1394 host controllers.

XP: Host controller configuration dialog

Note

Only Windows XP: When 1394 bus driver performance improvements are possible, the host controller configuration dialog will be shown. See *Figure 12: XP: DSP 1394 Driver Installer (Host Controller Driver Configuration)* on page 23.

Windows Vista / Windows 7: Go on reading Chapter *AVT camera configuration* on page 24.

In case 1 (1394 bus driver performance improvements are possible) and in case 2 (1394 bus driver performance improvements are **not** possible) the following window will appear:
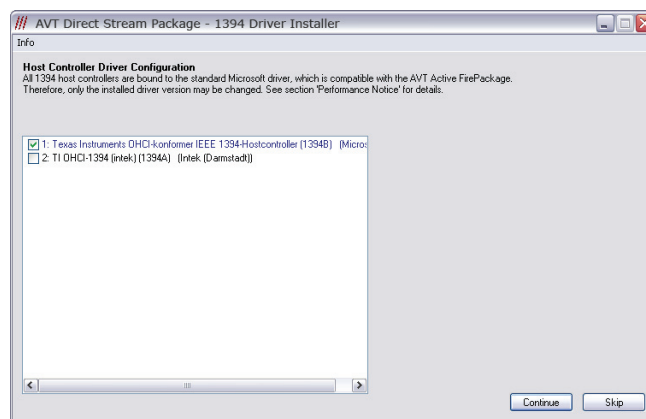

Figure 11: XP: DSP 1394 Driver Installer (Host Controller Driver Configuration)

Host controllers already bound to the Microsoft bus driver or AVT 1394 bus driver are displayed in green or blue color. Green entries represent per-

fectly configured adapters, whose configuration should not be changed by the user.

Blue entries represent adapters which would benefit from a driver downgrade to SP1. When such an adapter is selected, the downgrade option is shown on the right.

Note

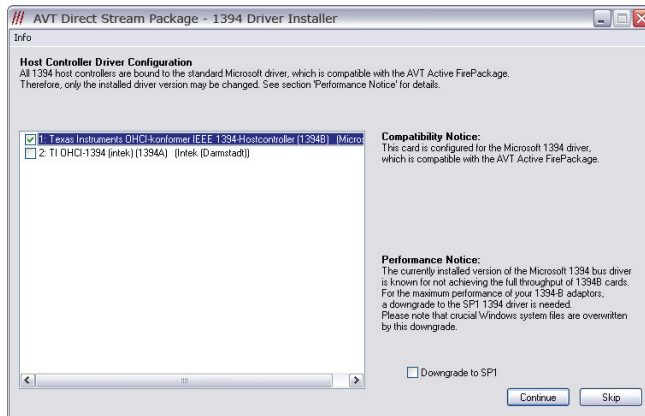Host controller driver downgrade is always performed system-wide.

Figure 12: XP: DSP 1394 Driver Installer (Host Controller Driver Configuration)

Controllers bound to unknown drivers are displayed normally (black color). These devices can be selected for re-configuration by use of the check boxes next to the device description.

AVT camera configuration

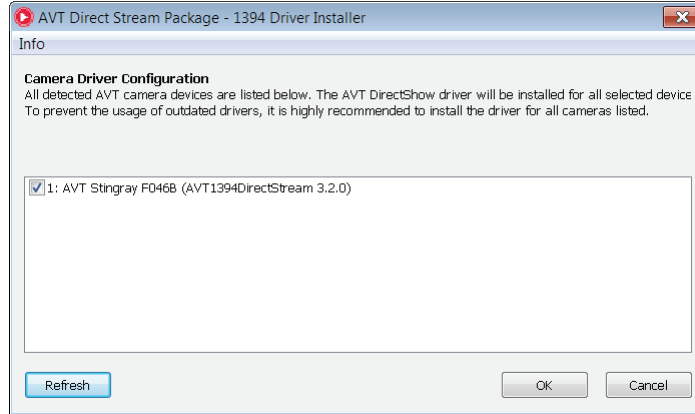The camera driver configuration dialog shows a list of all detected AVT cameras:

Figure 13: AVT camera configuration

Note

Cameras connected to a 1394 port that uses a non MS compliant driver, will not be displayed. SeeChapter *Technical background* on page 25.

2. If you connected additional cameras during the driver installation process, click **Refresh** to trigger a rebuild of the camera list.

    As default, all cameras are selected for driver installation.

3. Deactivate listed cameras that you don't want to be used with the **AVT Direct Stream Package** in order to keep their driver configuration untouched.

4. Click **OK.**

    The **AVT Direct Stream Driver** will be installed for all selected cameras.

Manual driver setup

This subsection describes how to manually install the camera driver.

Note

Configuration depends on your operating system:

*   1394a devices: Windows Vista / Windows 7: only camera driver
    1394b devices: Windows 7: only camera driver
    Windows Vista: bus driver + camera driver
*   XP: bus driver + camera driver

In most cases we recommend an installation via the **DSP 1394 Driver Installer**.

But there may be scenarios where it's advisable to install the driver manually, e.g.:

- If the software package installation via the **DSP 1394 Driver Installer** fails, you may try to install the driver manually.
- If an unknown FireWire card cannot be identified by the **DSP 1394 Driver Installer**, you have to install the driver manually.

Technical background

In order for **AVT Direct Stream Package** to recognize 1394 digital cameras that are connected to your system, the **AVT Direct Stream Driver** must be installed for each camera. This chapter explains how to install the driver **manually** in your system.

Note

(i)

If your 1394 camera comes with its own IIDC-compatible system software, do not use it, as it will not be compatible with **AVT Direct Stream Package**.

Installing driver manually (Windows XP, Windows Vista, Windows 7)

To install the DSP camera driver manually, perform the following steps.

1. Make sure **AVT Direct Stream Package** is installed on your system.

2. Connect your camera to the 1394 (FireWire) port.

   If no driver was previously installed for the camera, [XP:] the **Found New Hardware** dialog will appear:
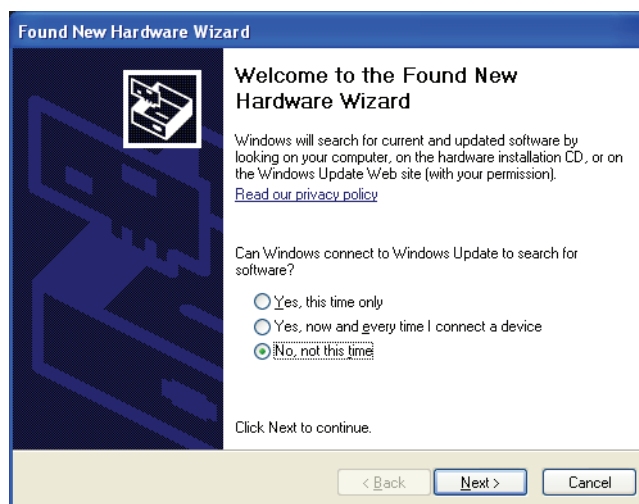

Figure 14: **AVT Direct Stream Package**: manual driver installation (Found New Hardware)

3. Depending on the dialog:

- If the dialog does not appear, proceed with Chapter *No New Hardware Found dialog (Windows XP) / Manual camera driver installation under Windows Vista or Windows 7* on page 26.

- If the dialog does appear [XP]: Choose **No, not this time** and click **Next**.

4. Select **Install the software automatically.** [If a warning message appears that the driver is not signed up / not certified with Microsoft then click **Continue Anyway**].

5. Click **Finish**.

   The installation of the **AVT 1394 Direct Stream Driver** for the selected camera is completed.

No New Hardware Found dialog (Windows XP) / Manual camera driver installation under Windows Vista or Windows 7

1. If the **New Hardware Found** dialog didn't appear after you connected your AVT 1394 camera:

Windows XP	Windows Vista / Windows 7
Right-click on **My Computer** and click **Properties**. Select the **Hardware** tab and click **Device Manager.**	**Start → Computer → System properties → Device Manager**

If there is no compatible driver installed, your camera will appear in the device list as a

[Windows XP:] Generic 1394 Camera
[Windows Vista / Windows 7:] Generic 1394 Desktop Camera

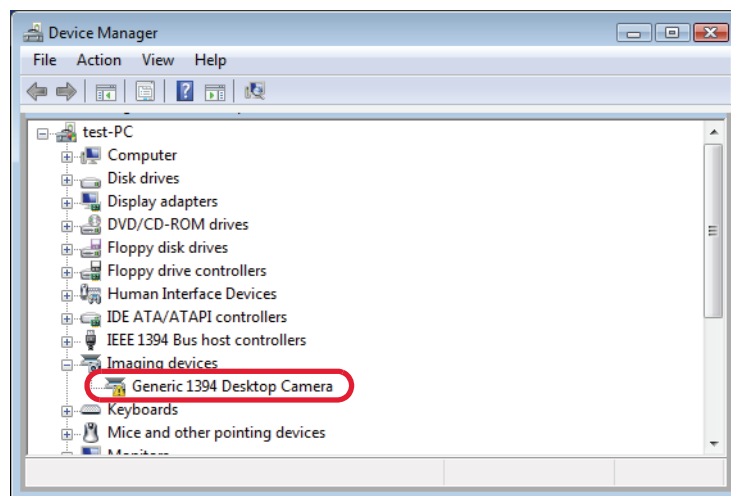with a question or exclamation mark next to it:

Figure 15: **AVT Direct Stream Package:** manual driver installation (Generic 1394 Desktop camera)

In order for the camera to work properly with **AVT Direct Stream Package** software, its driver must be changed to **AVT 1394 Direct Stream Driver**.

2. Right click on your device and select **Properties**. Choose the **Driver** tab and then click **Update Driver**.

#	XP	Windows Vista Windows 7
3.	Select **Install from a list or specific location** and click **Next**.	Choose **Browse my computer for driver software** and click **Next**.
4.	Select **Don't search, I will choose the driver to install** and click **Next**.	Choose **Let me pick from a list of device drivers on my computer**.

5. Click **Have disk** and provide the path to **AVT Direct Stream Package** driver folder where **AVT1394DSPCamera.inf** is located. Typically:

`C:\Program Files\Allied Vision Technologies\DirectStreamPackage\Driver`

6. Click **OK.**
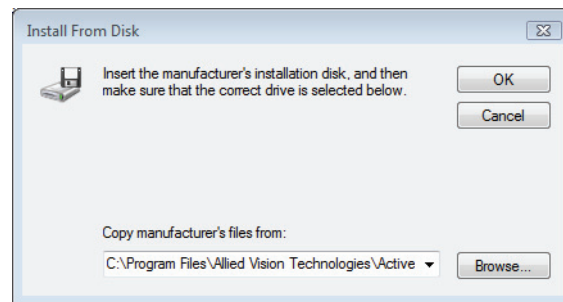
   The following dialog will appear:

Figure 16: **AVT Direct Stream Package:** manual driver installation (Install From Disk)

7. Click **OK.**

   The following dialog will appear:
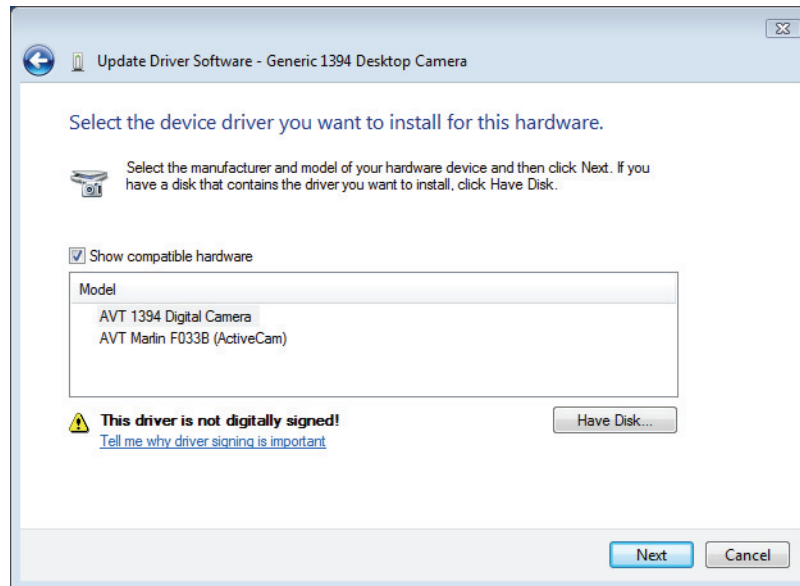
Figure 17: **AVT Direct Stream Package**: manual driver installation (Select the device driver…)

8. Choose the entry that matches your specific camera model, if available.

9. Ignore all signature warnings and continue until you reach the **Finish** dialog.

10. Click on **Close/Finish**.

11. Verify that your camera is now listed in the device manager as an **AVT [camera name] device (AVT1394DirectStream).**

    [camera name] is e.g. Stingray F080B

    The driver installation is now complete.

12. You might need to restart the system for the changes to come into effect.

Note

• Repeat the described procedure for each AVT camera you intend to use with **AVT Direct Stream Package**, regardless of the model.

• **AVT Direct Stream Package** works only with AVT 1394 digital cameras. (Prosilica EC and CV cameras are not supported.)

Components overview

This chapter describes the **package content.**

For more information see Chapter

Package content

The **AVT Direct Stream Package** consists of the following SDK components:

SDK component	Description
AVT1394DSPCamera.sys AVT1394DSPCamera.inf AVT1394DSPCamera.cat	WDM-based streaming driver and associated files for AVT 1394 cameras using Microsoft's or AVT 1394 bus driver
DSP1394DriverInstaller.exe 1394driverfiles.xml XPSP1_data*.*	Easy-to-use driver installation tool Contains all files needed for the XP driver rollback
AVT1394DirectStreamProperty.ax	Property pages to control AVT camera features Info: On 64-bit systems both versions (32 bit and 64 bit) are installed.
AVT_Convert.ax	Transform filter for converting AVT image formats to displayable and other usable image formats. Contains: conversions from AVT image formats and other image formats to RGB24, RGB32 Replaces: the YUV411 transform filter and the Y800 transform filter from the Direct FirePackage Info: On 64-bit systems both versions (32 bit and 64 bit) are installed.
AVTAmCap.exe	Example viewer for standard and advanced feature support

Table 5:   **AVT Direct Stream Package** SDK components

SDK component	Description
Header files	Definition of interfaces and interface types. Used for property pages access.
typeLibraries	Needed for non C++ projects.
Platform SDK helper	Visual Studio 2005 project files to build necessary helper classes from source contained in the Windows Platform SDK.
Documentation	• *AVT Direct Stream Property Set Documentation* which is also provided as help file (*AVT1394DirectStreamProperty.chm*) • Release Notes After installation of the package you will find all the documentation in the following default folder:
`C:\Program Files\Allied Vision Technologies\DirectStreamPackage\Doc`	

Table 5:   **AVT Direct Stream Package** SDK components

Together with the **AVT Direct Stream Package** the following example is provided:

Example	Description
Example viewer project	AMCap-based example for demonstrating DirectShow-based camera usage

Table 6: **AVT Direct Stream Package** example viewer project

Package architecture

The following diagram describes how the **AVT Direct Stream Package** is accessed by Windows applications:
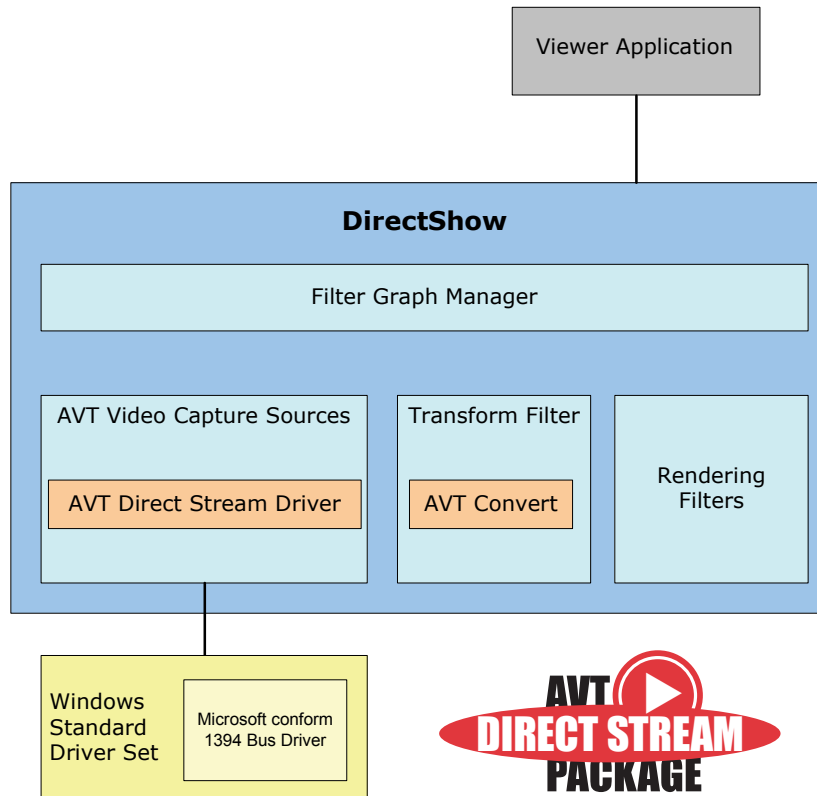

Figure 18: **AVT Direct Stream Package** architecture

Quick start for programmers

In this chapter you learn how to grab your first images with your AVT camera, open a project under Visual studio and use the given examples to do some typical image acquisition.

Note   For detailed information see
AVTDirectStreamProperty.chm

ⓘ

Tutorial: Step by step to the first frame

The following sample shows step by step, how to develop a C++ application to get frames from the camera and show them on the screen. The sample uses Visual Studio .NET 2005.

Step 1: Creating the Project

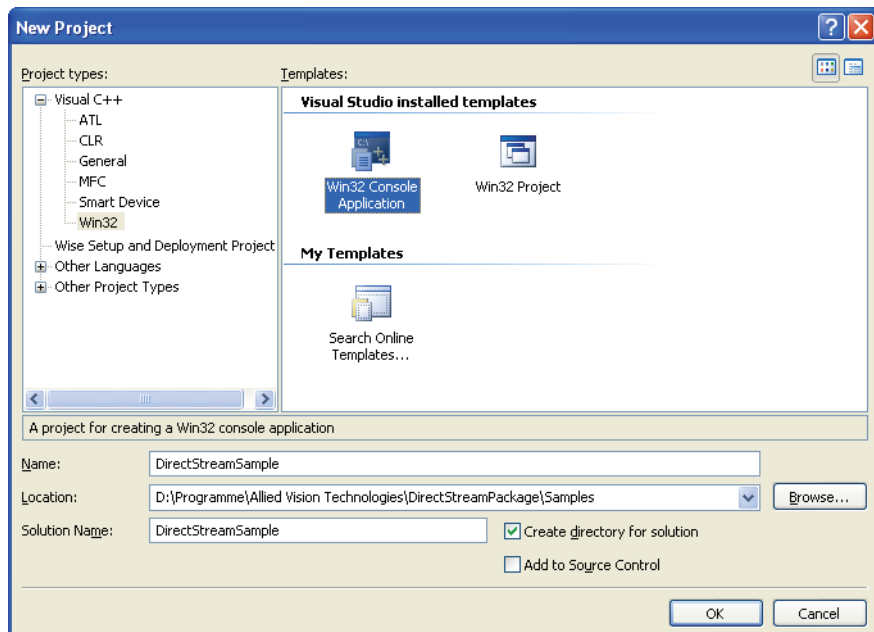The application is created as a simple console project.

Figure 19: Creating a new project

Step 2: Component Object Model (COM) and DirectShow

DirectShow is based on COM. That's why at first a COM initialization is required. Additionally, it's required to include some ATL helper classes. This makes the usage of COM much easier.

```cpp
// C++Sample.cpp : Defines the entry point for the
// Console application
//

#include "stdafx.h"

#include <atlbase.h>

int _tmain(int argc, _TCHAR* argv[])
{
  HRESULT hRes = CoInitialize(NULL);
  if( SUCCEEDED( hRes) )
  {
    CCaptureGraphData CaptureGraphData;
    hRes = CaptureGraphData.Initialize();
    if ( SUCCEEDED( hRes ) )
    {
      hRes = CaptureGraphData.BuildCaptureGraph();
      if( SUCCEEDED( hRes) )
      {
        CaptureGraphData.RunGraph();
      }
    }
    CoUninitialize();
  }
  return 0;
}
```

In addition DirectShow support has to be added to the project by including the required header files

```cpp
...
#include <atlbase.h>
#include <dshow.h>

int _tmain(int argc, _TCHAR* argv[])
...
```

and linking the following library:

C:\DXSDK\Samples\C++\DirectShow\BaseClasses\Release\strmbase.lib

Note

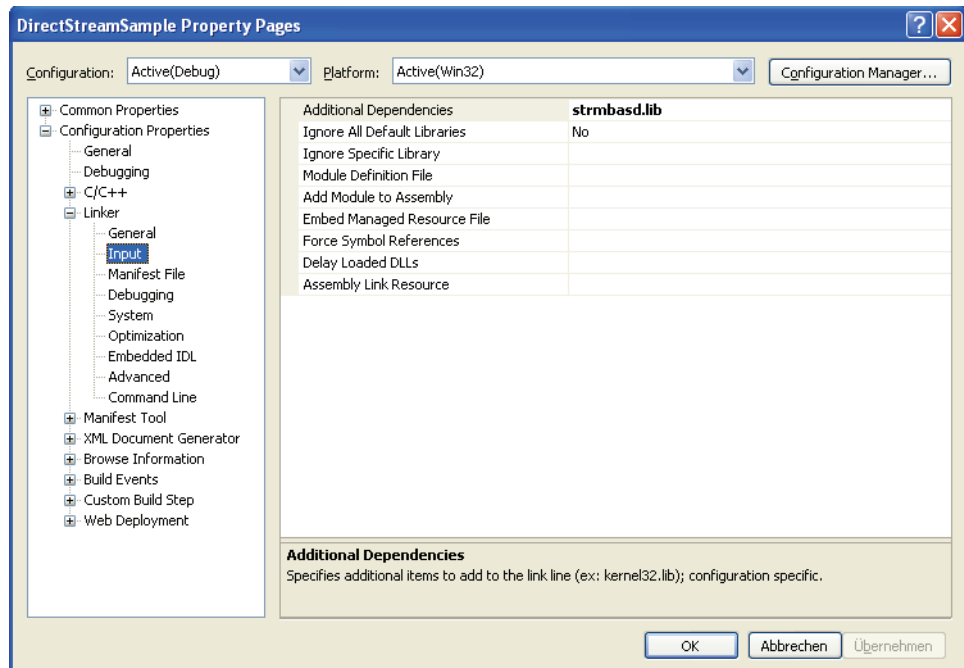The creation of **strmbasd.lib** is described in the help file of the platform SDK.

Figure 20: Link the **strmbasd.lib** library

Step 3: The filter graph

A central object in DirectShow is the filter graph. It represents the path of the image data, starting with capturing an image and ending with the image display on the screen.

Like all other objects in the COM model, the filter graph is represented by an interface. To display the image data on the screen, an interface is required to control the filter graph. DirectShow provides its own object to create the filter graph and add filter objects to the graph. The programming code for this is as follows:

```
class CCaptureGraphData
{
  CComPtr<IGraphBuilder>          m_pGraph;
  CComPtr<ICaptureGraphBuilder2>  m_pCapture;
  CComPtr<IMediaControl>          m_pMC;
  CComPtr<IVideoWindow>           m_pVideoWindow;
  CComPtr<IBaseFilter>            m_pSrc;
...
  HRESULT Initialize()
  {...}
  HRESULT BuildCaptureGraph()
  {...}

  HRESULT RunGraph()
  {...}
}

// Creates the necessary Com interfaces for the
// filter grab, the graph builder, media control and
// video window

HRESULT Initialize()
{
  HRESULT hRes;
  hRes = m_pGraph.CoCreateInstance(CLSID_FilterGraph,
          NULL, CLSCTX_INPROC_SERVER);
   if( SUCCEEDED(hRes) )
   {
    hRes = m_pCapture.CoCreateInstance(
  CLSID_CaptureGraphBuilder2,NULL,CLSCTX_INPROC_SERVER);
    if( SUCCEEDED( hRes) )
    {
     hRes = m_pGraph->QueryInterface( IID_IMediaControl,
           (void**) &m_pMC );
       if( SUCCEEDED(hRes) )
       {
       hRes = m_pGraph->QueryInterface(
             IID_IVideoWindow,(void**) &m_pVideoWindow);
       }
     }
   }
   return hRes;
}
```

Step 4: Adding the camera

At least a camera object is missing to complete the program code. To determine the camera object is a little bit difficult, but fortunately DirectShow guides us through this process.

First a device enumeration is created and it is initialized to enumerate all system devices that have the VideoInputDeviceCategory. The returned list (enumeration) can be walked through and the enumerated devices can be inspected for desired property.

```
#include <atlstr.h>
#include <dshow.h>

RESULT FindCaptureDevice( CComPtr<IBaseFilter> &pSrc)
{
    USES_CONVERSION;
    HRESULT                 hRes;
    CComPtr<IMoniker>       pMoniker = NULL;
    ULONG                   cFetched;
    CComPtr<ICreateDevEnum> pDevEnum = NULL;
    pSrc=NULL;
    hRes=pDevEnum.CoCreateInstance (CLSID_SystemDeviceEnum,
            NULL, CLSCTX_INPROC);
    if( FAILED( hRes) )
        return hRes;
    CComPtr<IEnumMoniker>   pClassEnum = NULL;
    hRes = pDevEnum->CreateClassEnumerator(
            CLSID_VideoInputDeviceCategory, &pClassEnum,0);
    if(FAILED(hRes) )
        return hRes;
    if( NULL == pClassEnum)
        return E_FAIL;
    while ( S_OK == ( pClassEnum->Next(1,&pMoniker,&cFetched)))
    {
        CComPtr<IPropertyBag> pBag;
        hRes = pMoniker->BindToStorage( 0,0,
                IID_IPropertyBag, (void**) &pBag) ;
        if( SUCCEEDED( hRes) )
        {
            VARIANT var;
            var.vt  = VT_BSTR;
           hRes = pBag->Read(L"FriendlyName",&var,NULL );
            if( SUCCEEDED( hRes) )
            {
                CString tmp( var.bstrVal );
                VariantClear( &var );
                if( tmp.Left(3) == "AVT" )
                {
               hRes = pMoniker->BindToObject( NULL, NULL,
                        IID_IBaseFilter, (void**) &pSrc);
                    if( FAILED( hRes) )
                        return hRes;
                    return S_OK;
                }
            }
        }
        pMoniker = NULL;
    }
    return E_FAIL;
}
```

Step 5: Showing the images on the screen

Finally connect the elements of the filter graph and run the resulting graph.

Build capture graph

```
HRESULT BuildCaptureGraph()
    {
        HRESULT hRes;
        hRes = FindCaptureDevice(m_pSrc);
        if( SUCCEEDED( hRes ) )
        {
            hRes = m_pCapture->SetFiltergraph( m_pGraph);
            if( SUCCEEDED( hRes) )
            {
                hRes = m_pGraph->AddFilter(m_pSrc,
                    L"Video Capture Source");
                if( SUCCEEDED( hRes) )
                {
                  hRes = m_pCapture->RenderStream(
                        &PIN_CATEGORY_CAPTURE,
                        &MEDIATYPE_Video,m_pSrc,NULL,NULL);
                }
            }
        }
        return hRes;
    }
```

Run filter graph

```
HRESULT RunGraph()
    {
        HRESULT hRes;
        if( NULL == m_pMC)
            return E_POINTER;
        hRes = m_pMC->Run();
        if( FAILED( hRes) )
            return hRes;
        Sleep(10000);
        return m_pMC->Stop();
    }
```

DirectShow creates its own window to display the frames.

The complete sample is part of the package.

System overview

This chapter gives you a short overview over the DirectShow system and its objects.

DirectX and DirectShow

DirectShow is a programming interface, provided by Microsoft, to handle streaming data in a simple way. DirectShow is a part of the Platform SDK / Windows SDK and also based on COM.

The **AVT Direct Stream Package** driver is implemented as kernel mode driver. DirectShow exposes WDM compatible video capture sources via the KSProxy as COM DirectShow CaptureSources.

Note	You need DirectX SDK 9 and the Platform SDK to develop Direct-Show applications.

Previous versions of the DirectShow SDK shipped as part of the DirectX SDK. The last version of the DirectX SDK that included DirectShow was *DirectX 9.0 SDK Update - (February 2005) Extras.* The DirectShow SDK was moved to the Windows Platform SDK starting with the Microsoft® Windows Server 2003 SP1 Platform SDK.

To get the latest DirectShow SDK, you have to download the latest version of the Windows SDK from

http://msdn.microsoft.com

The following diagram shows the relationship between an application, the DirectShow components, and some of the hardware and software components that DirectShow supports. **AVT Convert** and **AVT Streaming Driver** are from AVT.
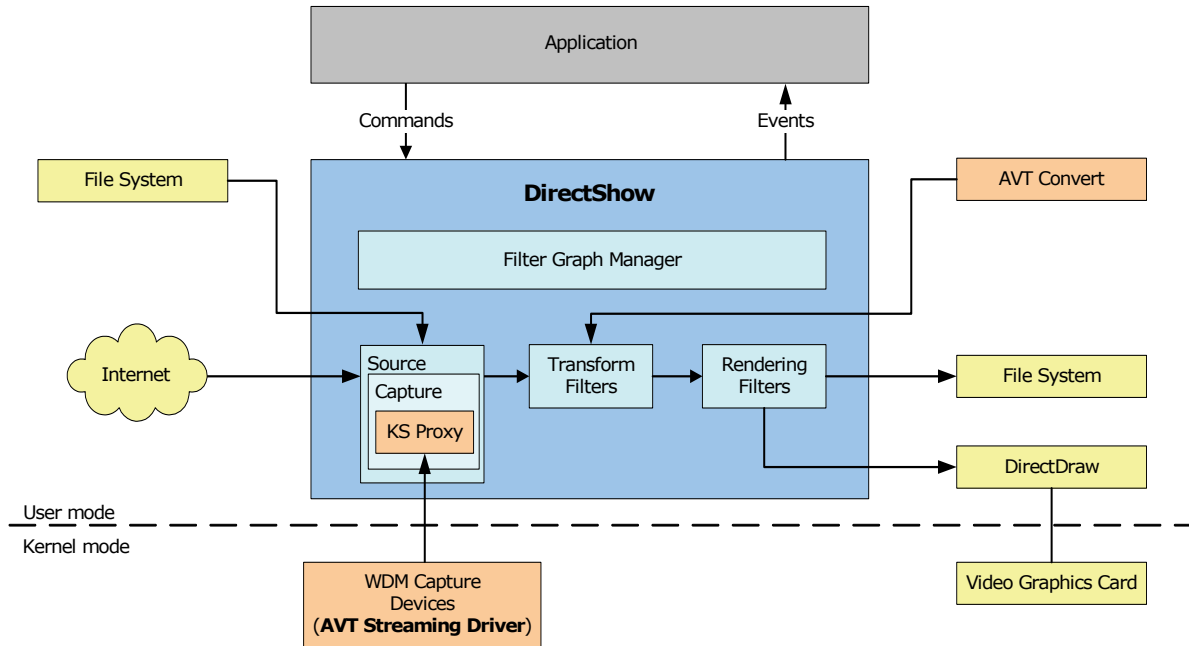

Figure 21: Architecture of **AVT Direct Stream Package**

Box	Color name	Description
	Blue	Direct Show
	Light red	AVT components
	Light yellow	Peripheral components (codecs, file system, DirectDraw, graphics card, internet)
	Grey	Application

Table 7: Colors and their meaning in architecture diagram

Description of the architecture diagram

The central object in DirectShow is the filter graph. This object manages the image data from capturing to showing them on the screen. For these purposes for each image processing step different filter graph objects are created.

To control the filter graph as well as to create and connect the particular filter graph objects DirectShow provides a filter graph manager. In order that the specific objects can exchange image data they have to negotiate to a consistent format. Therefore, every filter object provides so called pins as interconnecting points whereby each pin can provide different types and formats.

The following diagram shows in more detail a source filter and AVT Convert (a transform filter) connected through pins:
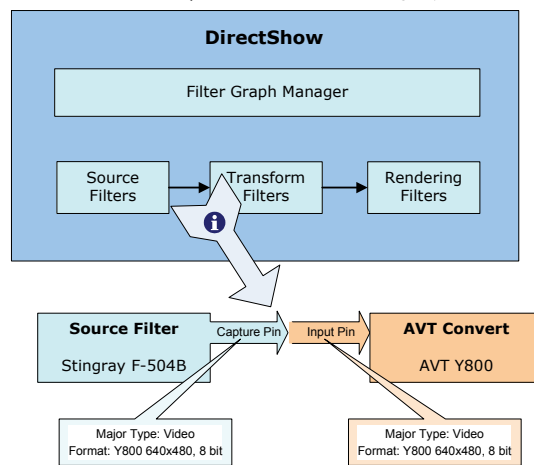

Figure 22: Example of filters connected through pins

If the filter graph manager receives the directive to connect the different filter graph objects, it searches for an input and an output pin of the same type and format.
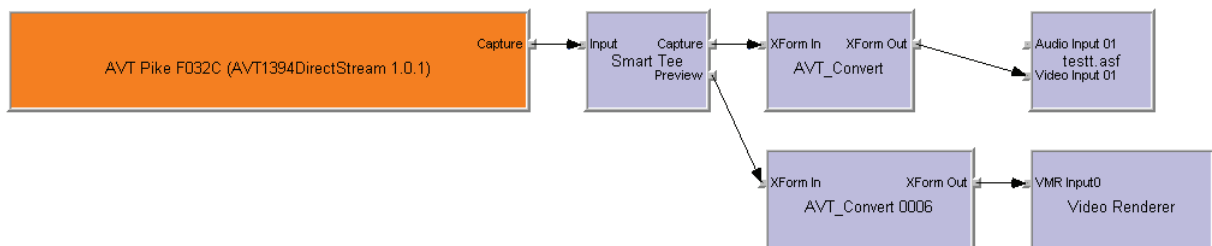

Figure 23: Example of typical filter graph

The diagram above shows a typical filter graph used to capture images from a video camera and to display them on a screen.

System architecture and streaming driver

The **AVT Direct Stream Package** includes a WDM streaming driver. This driver is embedded in Microsoft DirectShow and allows that in all corresponding programs AVT cameras are made available as video capture devices.
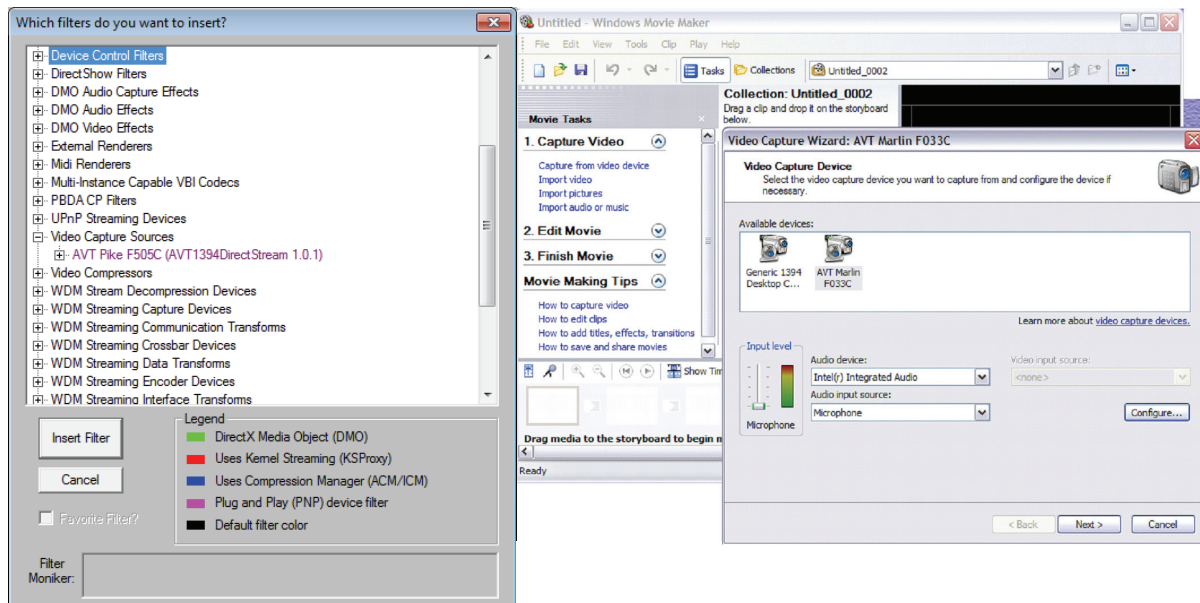
Figure 24: AVT cameras as video capture source

The driver is developed as video streaming miniclass driver.

Implemented DirectShow interfaces

The following DirectShow interfaces are supported by the 1394 capture source provided with the **AVT Direct Stream Package**:

DirectShow interface: IAMVideoProcAmp
- Implemented methods: all
- Implemented properties:
    - VideoProcAmp_Brightness
    - VideoProcAmp_Contrast
    - VideoProcAmp_Hue
    - VideoProcAmp_Saturation
    - VideoProcAmp_Sharpness
    - VideoProcAmp_Gamma
    - VideoProcAmp_ColorEnable (MirrorImage)
    - VideoProcAmp_WhiteBalance (WhiteBalance VR)
    - VideoProcAmp_BacklightCompensation (WhiteBalance UB)
    - VideoProcAmp_Gain

DirectShow interface: IAMCameraControl

- Implemented methods: all
- Implemented properties
  - CameraControl_Exposure (Shutter)
  - CameraControl_Tilt (mapped to AutoExposure)

DirectShow interface: IAMVideoControl

- Implemented methods
  - GetCaps
  - GetMode
  - SetMode

DirectShow interface: IAMStreamConfig

- Implemented methods: all
- Only VIDEO_STREAM_CONFIG_CAPS available, only for type FORMAT_VideoInfo. For media types see Chapter *Camera image formats and media types* on page 44.

DirectShow interface: ISpecifyPropertyPages

- Implemented methods: all

DirectShow interface: IAMDroppedFrames

- Implemented methods
  - GetAverageFrameSize
  - GetNumDropped
  - GetNumNotDropped

DirectShow interface: IKsPropertySet, IAMBufferNegotiation, IAMFilterMiscFlags, IAMPushSource

These interfaces are implemented indirectly via KSProxy.

DirectShow interface: IAMVideoCompression

This interface is not implemented (no compressed videos result from capture source)

Camera image formats and media types

In version 1.0, the capture device provides just one pin to the user:

• PINNAME_VIDEO_CAPTURE

and only the media type *video*.

The following table lists the camera image formats that are supported by the capture filter and the media subtype of its output.

Camera image format	Capture filter output (media subtype (video type))
Mono8	Y800
Mono12	AY12
Mono16	AY16
YUV422	UYVY
YUV411	Y411
RGB (RGB24)	BGR8
Raw8	ARW8
Raw12	ARW2
Raw16	ARW6

Table 8: Camera image formats and associated media subtypes

Media subtypes BGR8 and UYVY may be transformed and rendered with standard Windows DirectShow filters.

For conversions of all the other media subtypes to subtypes that may be rendered, the additional transform filter AVT_Convert is provided.

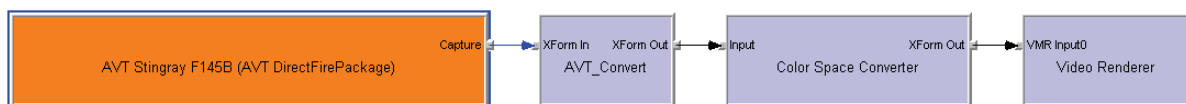See *Table 9: Image format transformations for RGB sensors provided by the AVT_Convert filter* on page 45.

Figure 25: Example of filter graph for color conversion

The following table shows all available transformations provided by the AVT_Convert filter:

Source format / Target format	RGB24 [Y,Y,Y] or 3*RAW8	BGR8 (RGB24 for Windows)	BGRA8 (RGB32 for Windows)	YUV422
Mono8 (Y800)	■	■	■	■
Mono12 (AY12)		■	■	
Mono16 (AY16)		■	■	
YUV411 (Y411)		■	■	
Raw8 (ARW8)	◆[2]	◆[1,2]	◆[1,2]	■
Raw12 (ARW2)	■	◆	◆	
Raw16 (ARW6)	■	■	■	

Color legend	Description
	conversion done by AVT_Convert

Table 9: Image format transformations for RGB sensors provided by the AVT_Convert filter

---

◆ optionally with additional color conversion functionality

[1]   selection of the debayering algorithm to be used (depends on camera types)

[2]   also available for interlaced cameras

Property pages: standard and advanced features

AVT Direct Stream Package installs some custom property pages, which represent standard and advanced features.

The following C++ code segment shows how to open a property page in an application:

Note

- You need to link the following files (for 32-bit Windows operating system):
  comccl32.dll, olepro32.dll, version.zip, winmm.lib, wfw32.lib, ksproxy.lib
- You need to link the following files (for 64-bit Windows 7):
  comccl32.dll, oleaut32.dll, version.zip, winmm.lib, wfw32.lib, ksproxy.lib
- For more information how to use property pages: see the corresponding chapters of the **Platform SDK help file**.
- If using a non-English operating system: property pages from Microsoft (Camera control page, Video ProcAmp page) will appear in the language of the operating system (e.g. German, when using German operating system).

```cpp
LRESULT CChildFrame::OnCameraproperties(WORD /
*wNotifyCode*/, WORD /*wID*/, HWND /*hWndCtl*/, BOOL
&bHandled)
{
  HRESULT hr;

  CComPtr<ISpecifyPropertyPages> pSpec;
  CAUUID cauuid;

  hr = m_pSrc->QueryInterface(IID_ISpecifyPropertyPages,
        (void **)&pSpec);

  if(SUCCEEDED(hr))
  {
    hr = pSpec->GetPages(&cauuid);

    // m_pSrc is a Ptr to a IBaseFilter Interface
    hr = OleCreatePropertyFrame(m_hWnd, 30, 30, NULL, 1,
        (IUnknown **)&(m_pSrc.p), cauuid.cElems,
        (GUID *)cauuid.pElems, 0, 0, NULL);

    CoTaskMemFree(cauuid.pElems);
  }

  bHandled = true;
  return 0;
}
```

Property pages: AVT_Convert

This property page is used to select the properties specifying the **AVT Convert Filter** attributes.

Proppage.dll exposes additional property settings (XForm In and XForm Out) for filters when REGISTERED with the operating system using the command **regsvr32 proppage.dll**.

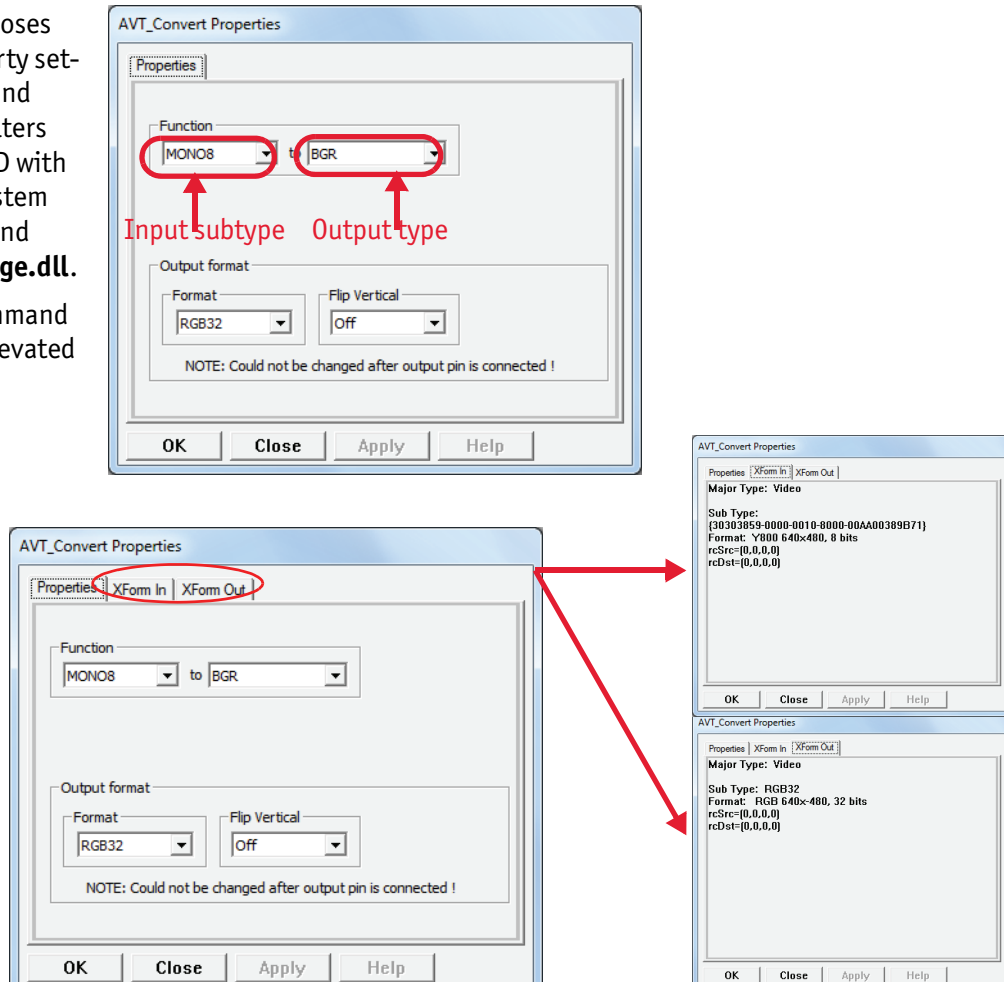The regsvr32 command must be run at elevated privileged level.

Figure 26: Property page: **AVT_Convert** (**Properties** tab)

Properties tab

Select from the following options:

Function: Depending on the input media type, the possible output types are displayed.

The following table lists the possible combinations:

(Pattern: *Input subtype* to *output type*)

Input type	FOURCC code	Input subtype	Output type	Output format
MONO8	'Y800'	MONO8	BGR	BGR24/BGR32
		RAW8 RGGB	BGR	BGR24/BGR32
			BGR Mono	BGR24/BGR32
			BGR 3x3	BGR24/BGR32
			BGR LCAA+V	BGR24/BGR32
			YUV422	
		RAW8 CYGM	BGR	BGR24/BGR32
			BGR Mono	BGR24/BGR32
			BGR 3x3	BGR24/BGR32
			BGR LCAA+V	BGR24/BGR32
			YUV422	
		RAW8 RAW	3*RAW8	BGR24/BGR32
YUV411	'Y411'	YUV411	BGR	BGR24/BGR32
			BGR Mono	BGR24/BGR32
MONO16	'AY16'	MONO16 RGB	BGR	BGR24/BGR32
RAW8	'ARW8'	RAW8 RGGB	BGR	BGR24/BGR32
			BGR Mono	BGR24/BGR32
			BGR 3x3	BGR24/BGR32
			BGR LCAA+V	BGR24/BGR32
			YUV422	
		RAW8 CYGM	BGR	BGR24/BGR32
			BGR Mono	BGR24/BGR32
			BGR 3x3	BGR24/BGR32
			BGR LCAA+V	BGR24/BGR32
			YUV422	
		RAW8 RAW	3*RAW8	BGR24/BGR32
RAW16	'ARW6'	RAW16 RGGB	BGR	BGR24/BGR32
		RAW16 RAW	3*RAW8	BGR24/BGR32
MONO12	'AY12'	MONO12 RGB	BGR	BGR24/BGR32
RAW12	'ARW2'	RAW12 RGGB	BGR	BGR24/BGR32
		RAW12 RAW	3*RAW8	BGR24/BGR32

Table 10: Possible combinations of AVT_Convert filter: Input subtype ⇨ output type

BayerPattern: Sets the layout of pixels in the CCD array of a Bayer camera with RGB color sensor or CYGM color sensor.

For the Guppy cameras with **RGB** color sensors the following layouts are possible:

Layout name	Description	Line number
RGGB	R G R G R	first line
	G B G B R	second line
GBRG	G B G B G	first line
	R G R G R	second line
GRBG	G R G R G	first line
	B G B G B	second line
BGGR	B G B G B	first line
	G R G R G	second line

Table 11: Bayer pattern for **RGB** color sensors

For the Guppy cameras with **CYGM** color sensors the following layouts are possible:

Layout name	Description	Line number
CYGM	C Y C Y C	first line
	G M G M G	second line
	C Y C Y C	third line
	M G M G M	fourth line

Table 12: Bayer pattern for **CYGM** color sensors

Output Format: Select the desired output format.

Note   The output format cannot be changed after output pin is connected.

Format: Depending on the output type the following values are possible:

output type: *YUV422*

YUV422
The output format is YUV422.

output type: *BGR* or *3*RAW8*

RGB32
The output format is RGB32.

RGB24
The output format is RGB24.

Flip Vertical: This property modifies the alignment of the image.

The following values are possible:

On
The image is flipped vertically.

Off
No image flipping is performed.

Auto
Depending on the downstream filter, automatic alignment is performed.

Note   YUV422 is only possible with Auto.

Property pages: AVT-own tabs

In this chapter tabs programmed by AVT are described briefly (in alphabetical order):

Chapter *Color tab (AVT)* on page 51

Chapter *Direct Access tab (AVT)* on page 53

Chapter *Exposure tab (AVT)* on page 54

Chapter *Format tab (AVT)* on page 56

Chapter *Info tab (AVT)* on page 58

Chapter *LUT tab (AVT)* on page 59

Chapter *Smart Feature 1 tab (AVT)* on page 61

Chapter *Trigger tab (AVT)* on page 63

Note

- Most changes done on the property pages **take effect immediately** except if stated differently.
- Depending on the Windows version and the DirectShow application you use ... :
    - ... action is needed: Click **Apply** for changes to take effect.
    - ... changes made to AVT features on the AVT property pages **may not be mirrored** on the standard DirectShow pages and vice versa.
- Features not supported by the camera are displayed in grey.

Color tab (AVT)

This tab is for adjusting:
- White balance UB
- White balance VR
- Hue
- Saturation
- Color correction
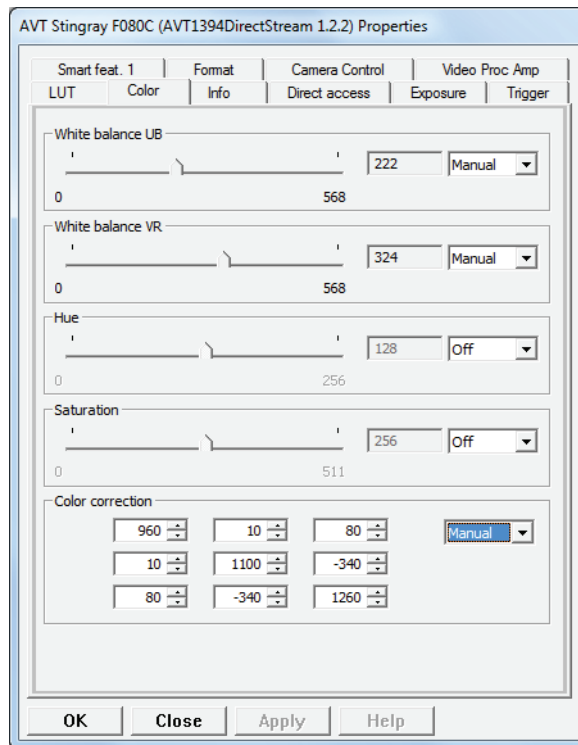
Figure 27: **Color** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Slider	White balance UB		
Slider	White balance VR	Edit box: Enter here numeric values	For entering values choose Manual from combo box
Slider	Hue		
Slider	Saturation		
Edit boxes in matrix formation	Color correction		

Table 13: **Color** tab (AVT)

Direct Access tab (AVT)

This tab allows direct access to the register addresses of the camera (standard IIDC registers and AVT camera-specific (vendor-specific) advanced registers).
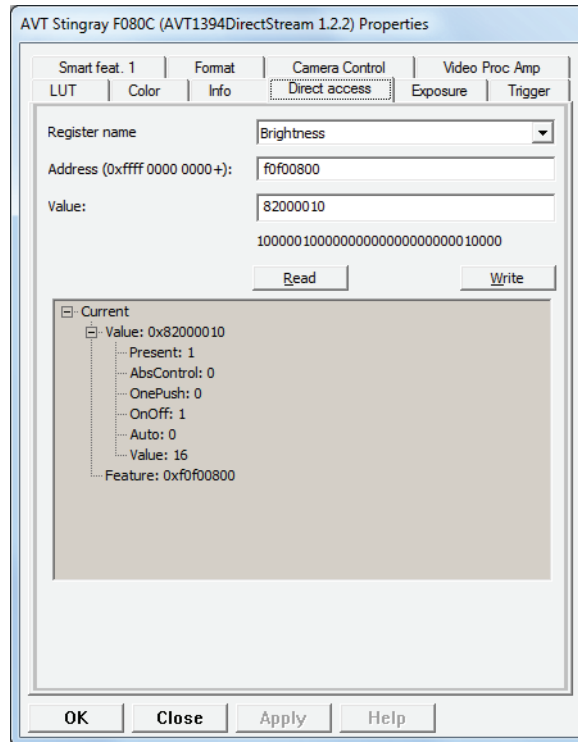
Figure 28: **Direct access** tab (AVT)

Control element	Use for adjusting...	Further elements (description)
Number field	Hexadecimal address	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families.
Number field	Value for this address	
Read button	Read value from this address	
Write button	Write value from this address	

Note	All changes take effect immediately.
ⓘ	

Table 14: **Direct access** tab (AVT)

Exposure tab (AVT)

This tab is for adjusting:

- Brightness
- Gain
- Shutter + extended shutter
- Gamma
- Auto Exposure
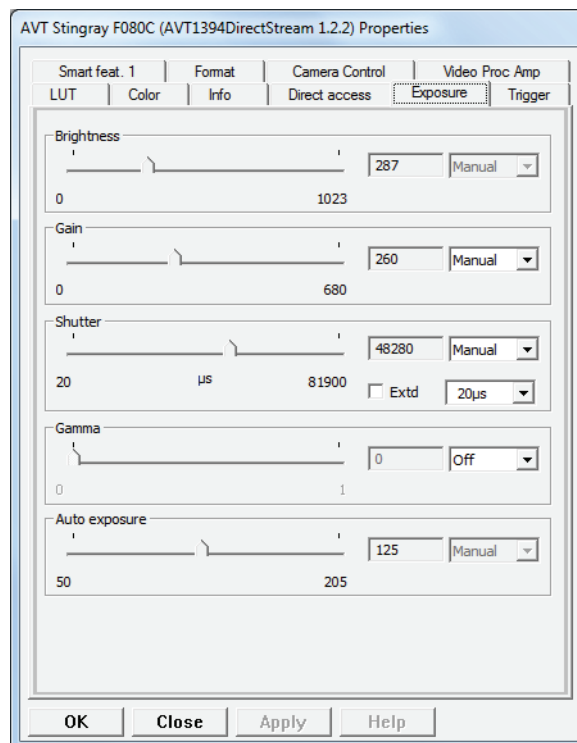
Figure 29: **Exposure** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Slider	Brightness	Edit box entering numeric values For entering values manually choose **Manual** from combo box	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families.
Slider	Gain	Edit box entering numeric values For entering values manually choose **Manual** from combo box	
Slider	Shutter (exposure)	Edit box entering numeric values • Choose time base combo box to adjust time base • For entering values manually choose Manual from combo box and activate Extended shutter check box	
Slider	Gamma	Combo box to switch on/off gamma Edit box entering numeric values For entering values manually choose **Manual** from combo box	
Slider	Auto Exposure	Edit box entering numeric values For entering values manually choose **Manual** from combo box	

Note	• All changes take effect immediately **except modifications to the time base value.** • Changing the time base can only take place: – if the camera is **not** grabbing images

Table 15: **Direct access** tab (AVT)

Format tab (AVT)

This tab is for adjusting:
- Image mode and position (AOI: only Format_7)
- Frame rate in fps
- ISO channel and ISO speed (S100/S800)
- Multi-shot/free-run
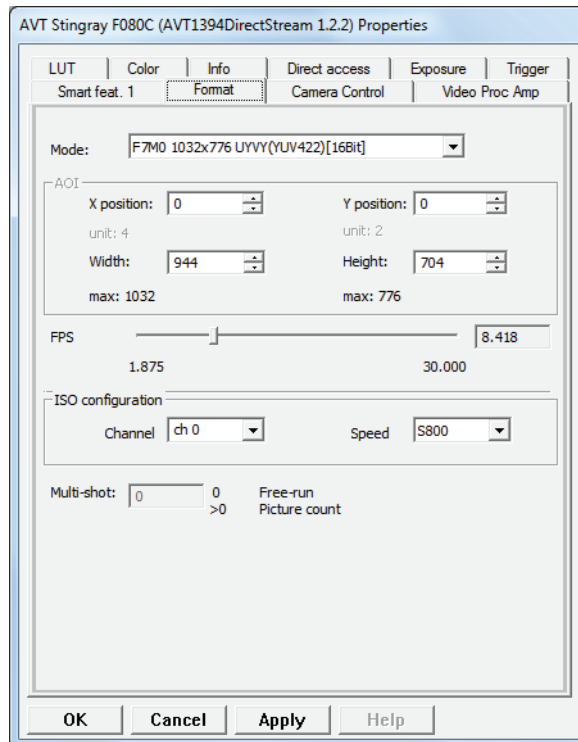
Figure 30: **Format** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Combo box	IIDC fixed modes and Format_7 modes	The last selected mode in the list is always shown.	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT 1394 camera families. **Note** ⓘ With AVT Direct Stream Package smaller AOIs don't allow higher frame rates.
Edit boxes and spinners	AOI settings: X / Y position of image Width / height of image (Only in Format_7 modes)	Edit boxes/spinners entering/changing numeric values This is the way you can define AOI. In the edit boxes the last selected value is shown.	
Slider	Frame rate (in fps = frames per second)	Edit box entering numeric values	
Combo box	Channel	Set no. of ISO channel for image transport. (This is a 4-bit address to identify the source of a video data stream). Normally set to Any. Select **Any**, if driver can decide which channel should be used. Otherwise all cameras connected to one bus must have a different ISO channel. The last selected no. is shown.	
Combo box	ISO speed (S100, S200, S400, S800)	Camera/bus supported ISO speeds. The last selected ISO speed is shown.	
Edit box	Number of multi-shot images	Currently not implemented.	

Note ⓘ	• All changes can **only** take place if the capture filter is **not** part of a connected filter graph. • Most changes (but X/Y position) are only written to camera by clicking **Apply**.

Table 16: **Format** tab (AVT)

Info tab (AVT)

This tab shows the following information:

Camera Info:
- Camera (model)
- Serial number
- Driver version number
- Microcontroller version
- FPGA version

Bus Info:
- Bus utilisation information
- Bytes Per Packet used by the camera
- byte per packet free on the bus the camera is connected to
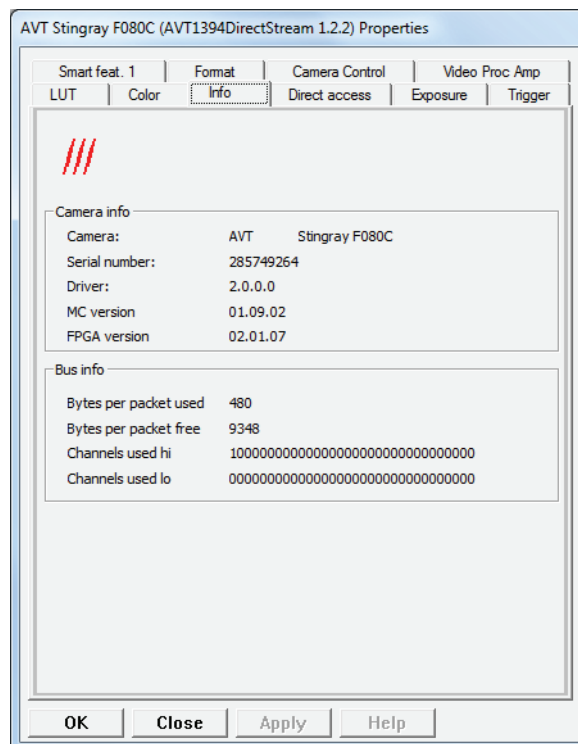- Allocated Iso channels on the camera bus

Figure 31: **Info** tab

LUT tab (AVT)

This tab is for:

- Controlling the LUT (switch on/off and choose LUT number)
- Loading LUT files from a csv file
- Copying a LUT into the camera
- Showing diagram of a LUT
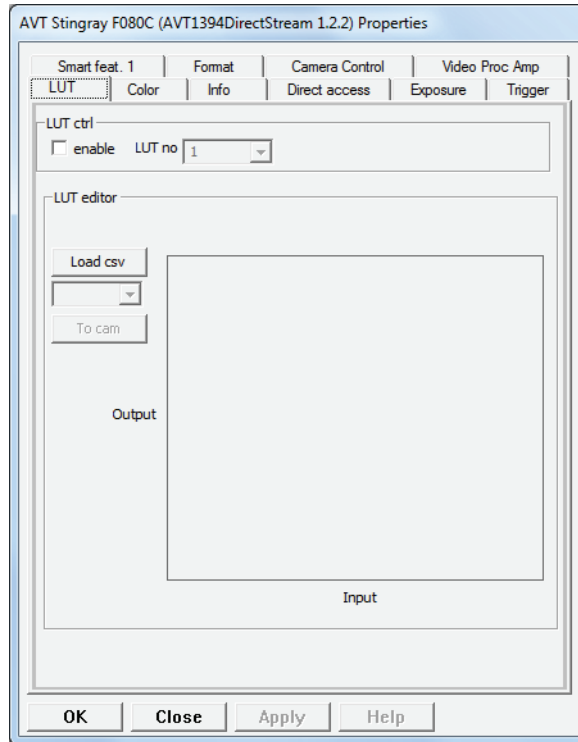
Figure 32: **LUT** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Check box		**Enable** check box: switch LUT on/off	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families.
Combo box		LUT no: If more than 1 LUT is available, choose desired LUT.	

Table 17: **LUT** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
LUT Editor	Loading csv file, choosing LUT, copy LUT and displaying LUT	**Load CSV** button: Click to load SmartView compatible csv file. In case of several LUTs, all LUTs are loaded into the editor.	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families.
		Combo box: The LUT's name from the csv file is displayed. Choose one from the loaded LUTs.	
		To Cam button: Loads the chosen LUT into the camera.	
		Diagram Input/Output: Chosen LUT is displayed as diagram.	

Table 17: **LUT** tab (AVT)

A SmartView compatible csv file looks like (comment lines are allowed, the header content can be quoted):

```
CamName Separator LUTName ( ... Separator LUTName)
InputValue1 Separator OutputValue1 (... Separator Output)
...
InputValueN Separator OutputValueN (...)

Meaning of N: Number of LUT entries
Separator: ([;]) that means: the only possible separator is
semicolon
Value: Integer
```

Example csv file:

```
Pike;Gamma0.75;Gamma0.9
0;0;0
...
100;357;166
```

Smart Feature 1 tab (AVT)

This tab is for adjusting:

- Display test image
- DSNU correction (if available)
- High SNR (if available)
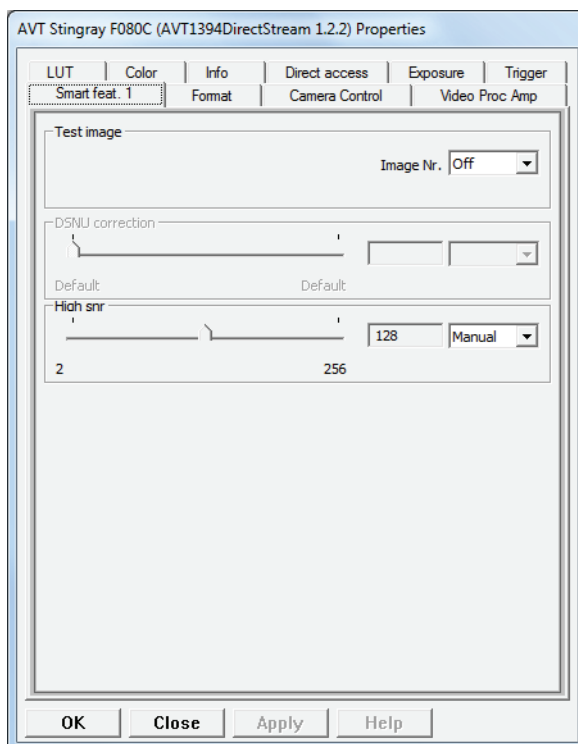
Figure 33: **Smart Feat. 1** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Combo box	Test image on/off

Choose test image number | | For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families. |

Table 18: **Smart Feat. 1** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Check boxes / slider	DSNU correction	Edit box entering numeric values	For entering values choose **Manual** from combo box
Slider	High SNR	Edit box entering numeric values	

Note	• All changes take effect immediately **except modifications to the High SNR**.
	 • Changing the HighSNR feature can **only** take place:
	   – if the camera is **not** grabbing images and
	   – if the capture filter is **not** part of a connected filter graph.

Table 18: **Smart Feat. 1** tab (AVT)

Trigger tab (AVT)

This tab is for adjusting:

- Trigger modes
- Trigger delay
- Delayed IntEna (integration enable)
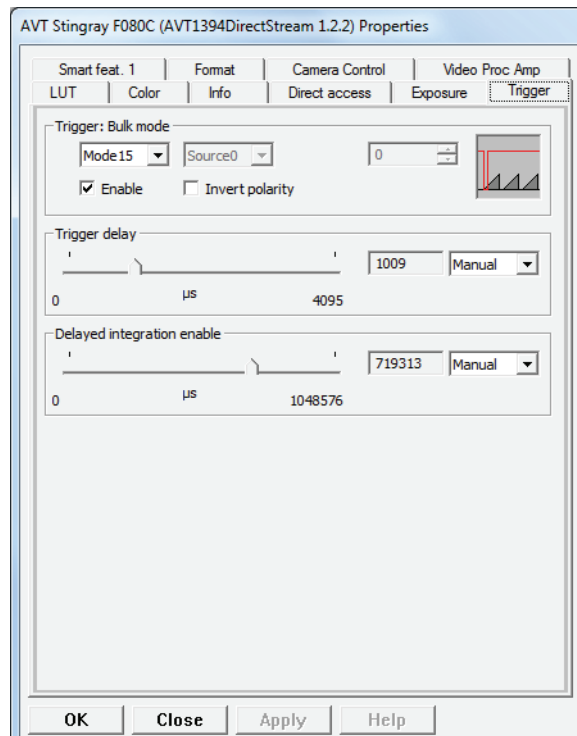
Figure 34: **Trigger** tab (AVT)

Control element	Use for adjusting...	Further elements (description)	
Combo box	Trigger mode: edge mode (0) level mode (1) progr. mode (15) 2nd combo box: IIDC trigger source [not implemented: has no meaning]	**Enable** check box: switch on/off **Invert Polarity** check box (falling/rising, high/low)	For a detailed description of all available standard IIDC registers and vendor-specific advanced registers: see the **Technical Manuals** of the AVT camera families.
Slider	Trigger delay	Combo box: on/off Edit box: delay in µs	
Slider	Integration enable delay	Combo box: on/off Edit box: delay in µs	

Note	• All changes take effect immediately **except modifications to the Trigger feature**.
	• Changing the triggering can **only** take place:
	  – if the camera is **not** grabbing images and
	  – if the capture filter is **not** part of a connected filter graph

Table 19: **Smart Feat. 1** tab (AVT)

Standard DirectShow tabs

In this chapter tabs automatically provided by DirectShow are described briefly in alphabetic order. Some of these features are mapped by AVT to AVT-own features and have therefore a different meaning, although the original DirectShow name is displayed all the time (see the following tables).

For **standard** DirectShow tabs see the following subsections:

Note

ⓘ

- **Camera control** tab, **Capture** tab**,** and **Video Proc Amp** tab are a fixed part of DirectShow.
- These tabs cannot be switched off and appear always in the language of your operating system.
- Depending on your application you are using, the DirectShow tabs may be the only tabs shown. Due to AVT mapping the most needed features can be controlled anyway.
- Depending on the Windows version and the DirectShow application you use ... :
  - ... action is needed: Click **Apply** for changes to take effect.
  - ... changes made to AVT features on the AVT property pages **may not be mirrored** on the **standard** DirectShow pages and vice versa.
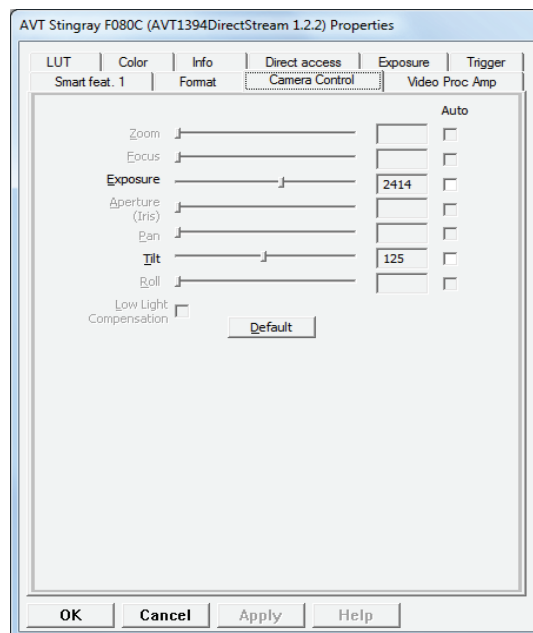
Figure 35: **Camera control** tab (DirectShow)

Camera Control tab (DirectShow)

This tab is for adjusting:

- Zoom: not implemented
- Focus: not implemented
- Exposure: mapped to shutter
- Iris: not implemented
- Pan: not implemented
- Roll: not implemented
- Tilt: mapped to auto exposure

Control element	Use for adjusting...	Further elements (description)
Slider	Focus	This feature is not implemented.
Slider	Zoom	This feature is not implemented.
Slider	Exposure	AVT has mapped this feature to **shutter.**
Slider	Iris	This feature is not implemented.
Slider	Pan	This feature is not implemented.
Slider	Roll	This feature is not implemented.
Slider	Tilt	AVT has mapped this feature to **auto exposure**.
Note: All changes take effect immediately.		

Table 20: **Camera control** tab (DirectShow)

Capture tab (DirectShow)

This tab is just for information about available formats and media types.

Video Proc Amp tab (DirectShow)

This tab is for adjusting:

- Brightness
- Contrast: mapped to gain
- Hue
- Saturation
- Sharpness
- Gamma
- White balance: mapped to white balance VR
- Back light compensation: mapped to white balance UB
- Gain
- Color enable: mapped to mirror image
- PowerLine Frequency (Anti Flicker)
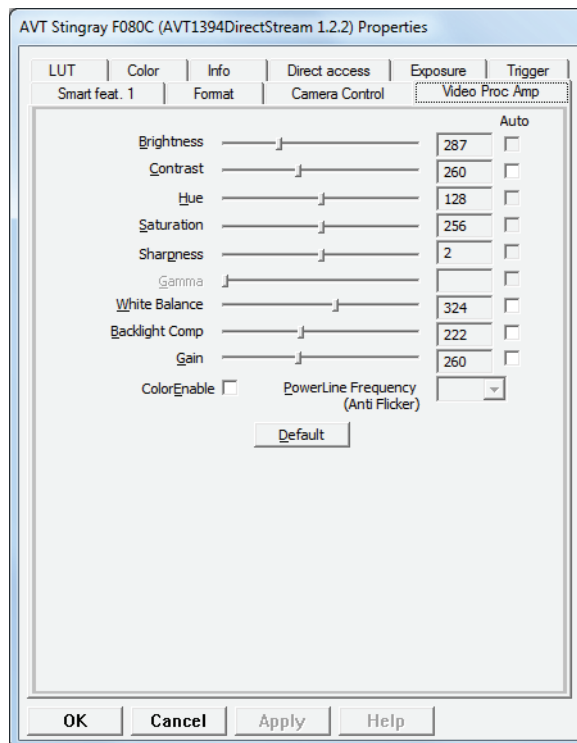
Figure 36: **Video Proc Amp** tab (DirectShow)

Working with the examples

As already mentioned in *Table 6: AVT Direct Stream Package example viewer project* on page 30, **AVT Direct Stream Package** comes with one example viewer project and one project containing the source code listed in Chapter *Quick start for programmers* on page 32ff. You can open these projects and adjust them to your needs.

In these projects, some environment variables were used to allow you successful compilation without the need of adjusting project options.

They are:

Environment variable	Description
PATH_PSDK	for the path to the platform SDK
PATH_DX9	for the path to DirectShow 9
PATH_DSHOW_BASECLASSES_DEBUG	for the path to the debug version of strmbase.lib
PATH_DSHOW_BASECLASSES_RELEASE	for the path to the release version of strmbase.lib

Table 21: Environment variables

Note

ⓘ

If **U**ser **A**ccount **C**ontrol (**UAC**) is activated, the example projects cannot be compiled directly (i.e. from the `C:\Program Files` directory).

In this case you get one or more error messages:

e.g. *Could not create output directory*

The reason for these messages are missing write permission due to **U**ser **A**ccount **C**ontrol (**UAC**).

Read Chapter *Workaround for UAC problems* on page 68.

For basic information on **U**ser **A**ccount **C**ontrol (**UAC**) read Chapter *User Account Control (UAC)* on page 69.

Workaround for UAC problems

To solve the compiling problems under UAC, perform the following steps:

1. Locate the installation directory:

   e.g.

   `C:\Program files\Allied Vision Technologies\DirectStreamPackage`

2. Copy `DirectStreamPackage` directory to your desktop (or one of your user directories).

3. On desktop open `Samples` directory and search for `*.sln`.

4. Doubleclick desired `*.sln`.

   Visual Studio opens this file.

5. You can work with this files as usual (e.g. compile) without getting the error messages listed above.

User Account Control (UAC)

Compiling projects   To compile the example project under Windows Vista / Windows 7, copy the project to a user-writable location as described in Chapter *Workaround for UAC problems* on page 68.

Note   For more information on Microsoft Vista / Windows 7 User Account Control (UAC) read Chapter *Special advice when working with Windows Vista / Windows 7* on page 10.

UAC warning   An example of an **UAC warning** when a program wants to write in a system folder is the following:
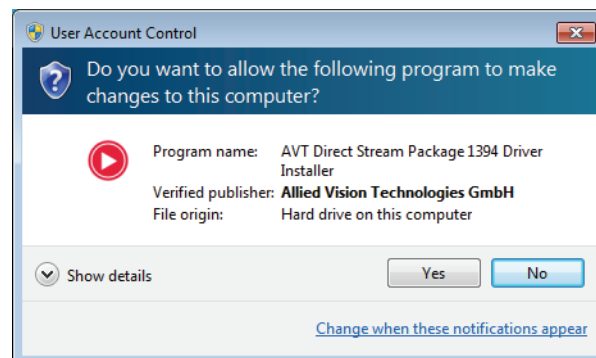
Figure 37: UAC warning: example

In this case just click **Yes** and go on working.

Redistribution

Introduction

Distribution of **AVT Direct Stream Package**-based software also requires the redistribution of **AVT Direct Stream Package** components.

This section describes the redistribution of components on a file basis. When this approach is chosen, it lies in the responsibility of the packager that all required components are installed on the target system.

Alternatively, the whole installer package provided by AVT may be integrated in third-party installers.

Mandatory requirements

You should always include the Direct Stream driver *AVT1394DSPCamera.sys* as well as *AVT1394DSPCamera.inf* and *AVT1394DSPCamera.cat* in your distribution package and make sure the user installs it before starting your application.

For this, either distribute the *DSP1394DriverInstaller.exe* and if required the files needed for XP installation (*1394driverfiles.xml* and the files in the XPSP1_data sub-directory) with your package or write a short documentation how to install the driver manually.

If you create an application using **AVT Direct Stream Package**, your distribution package should include the file *AVT1394DirectStreamProperty.ax*, which contains the property pages to control AVT cameras.

This DLL must be registered on the end-user's system before the application can use it.

Therefore, you may want your setup program to register this DLL when the application is installed. You can do it by passing the complete path to *AVT1394DirectStreamProperty.ax* as an argument to *regsvr32.exe*, or you can write your own setup program to register this DLL directly instead.

Info

Under 64-bit systems this DLL should be registered twice:

- For the 64-bit system: in *system32* folder
- For the 32-bit system: in *syswow64* folder

Additional requirements

For complete support of color cameras, the transform filter for color conversion *AVT_Convert.ax* should also be installed and registered.

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