Noldus
Information Technology

Media Recorder™

Software for the synchronous recording of video or other sources

Reference Manual
Version 4

Innovative solutions for behavioral research

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Chapter 1

Media Recorder

Introduction

Media Recorder is a software package that makes digital video files with input of many different types of cameras. These video files can be used in the video analysis programs The Observer XT, EthoVision XT and FaceReader.

VIDEO DEVICES

Media Recorder is supported with several types of video devices. In the section on the type of device, you find which specific devices are tested and supported, how many devices you can use simultaneously, at what frame rate and resolution and in which Noldus software.

Media Recorder is supported with the following devices types. See the section on the device type which specific video device has been tested.

- **Analog cameras** (page 22).
- **IP cameras** (page 24).
- **USB cameras** (page 27).
- **The DanioVision FireWire system** (page 29).
- **GigE cameras** (page 30).
- **Screen capture devices** (page 31).

We recommend to create a test recording with your devices first before you carry out the actual recordings, especially when you have more or other devices than we officially support. See also **Appendix C** on page 75.

MODULES

Media Recorder has the following modules:

- **Base Module** – To record up to four video files simultaneously. However this number depends on the type of video device, since multiple cameras are not supported for all devices. See the section on your device how many devices are supported at what frame rate and resolution.
- **Additional Camera Module 1-6 camera** – For analog, or IP cameras only. To extend the number of cameras to 6.
- **Additional Camera Module 1-8 cameras** – For IP cameras only. To extend the number of cameras to 8.
- **MR Screen Capture Module** – To create a video recording of the monitor of the computer with Media Recorder.

STANDALONE OR WITH COMMANDS

Media Recorder can be used as a standalone program to create video files. It is also possible to send commands with The Observer XT to Media Recorder. This way, recording with Media Recorder starts automatically when starting an observation in The Observer XT and stops when ending this observation. Furthermore, the videos obtained this way can automatically be linked to an observation and are then automatically synchronized with the manually scored events.

It is also possible to control recording with commands from EthoVision XT, for example to start recording when a mouse leaves the shelter.

THIS MANUAL

This manual describes how to use Media Recorder 4 with the supported recording devices. The procedures in this manual about devices from companies other than Noldus IT, describe the status at the moment this manual was written. These procedures may change afterwards without our knowledge.

If you have any problems, questions, remarks or comments, please let us know. See **TECHNICAL SUPPORT** on page 72 for contact information.

What's new in Media Recorder 4

If you have been using a previous version of Media Recorder, you should read this section to get an idea of the improvements in this version.

WHAT'S NEW COMPARED TO VERSION 3

Windows 7, 64 bit and Windows 10, 64 bit compatible

Media Recorder is compatible with the 64 bit versions of Windows 7 and Windows 10. For more information, see "System requirements for Noldus software" on www.noldus.com/downloads.

Supported devices

Media Recorder 3 was supported with IP cameras, the Microsoft LifeCam Studio, and some screen capture devices. Media Recorder 4 is supported with the following devices:

- Analog cameras in combination with a Euresys Picolo U4, or U8 H.264 frame grabber card.
- IP cameras
- USB cameras
- The camera from the (old) DanioVision FireWire system

- GigE cameras
- Screen capture devices

See **Supported devices** on page 14 for a full overview of the devices that were tested with Media Recorder 4.

MR Screen Capture Module

You can extend your basic Media Recorder license with the MR Screen Capture Module. With this module, you can capture the screen or windows on the monitor of the computer with Media Recorder.

Frame rate and resolution of IP cameras

In previous versions of Media Recorder, changing the frame rate and resolution of IP cameras was done with the tool Onvifprofilemanager. Changing the frame rate and resolution is now done in Media Recorder itself.

Improved video output

The video output Picture by Picture was improved. In previous versions the videos were surrounded by black areas. These have been removed.

What's new compared to version 2.5

Additional Camera Modules

For analog, and IP cameras it is now possible to extend the number of cameras to six and for IP cameras to eight.

Pan, tilt, zoom control for IP cameras

It is now possible to pan, tilt and zoom the IP cameras with Media Recorder. So it is no longer necessary to use a web browser for that purpose. It is also possible to use a joystick for pan, tilt, zoom control.

Audio from IP cameras

Media Recorder can now record audio from IP cameras, if they have their own microphone, or an audio input. It is no longer necessary to use a separate microphone connected to line-in of the computer.

IP camera brands

Media Recorder versions 2.5 and lower only supported Axis IP cameras. Media Recorder 4 supports all IP camera brands that support RTSP communication and produce an H.264 video stream.

New supported device

Media Recorder 4 now supports the Basler acA1920-155um professional USB camera.

Upgrade to Media Recorder 4

Upgrade Media Recorder

To upgrade Media Recorder to version 4.0, insert the installation USB stick into your computer. Run the file **Media Recorder 4.0 Setup.exe**. Media Recorder 4 does not overwrite a previous version of the software. We recommend to uninstall previous versions.

Please take notice of the following notes:

- If you have a previous version of Media Recorder on a computer with another operating system than the 64-bit versions of Windows 7 or 10, you should either upgrade Windows, or install Media Recorder on a computer with one of these operating systems. If you have Windows 8.1, be aware that we performed only a quick test with this operating system.

- After upgrading to Media Recorder 4, new settings should be made for the cameras.
- The video files that were made with Media Recorder 2.0, or lower, were stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder. Also after upgrading the videos are stored in this folder. However, if Media Recorder 4 is installed on a computer that did not contain a previous Media Recorder version, the video files are stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder\Video Files. This location can be changed in the main Media Recorder window.

UPGRADE RECORDING DEVICES

Upgrade device drivers

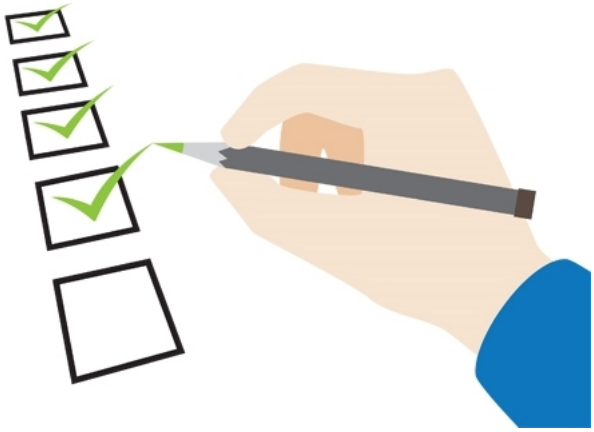
Some recording devices come with new drivers. Since the old drivers were not tested with Media Recorder 4, we cannot guarantee that they work. We recommend to uninstall the old drivers with Windows **Programs and Features**. To do so, open the Control Panel and select **Programs and Features**. Locate the driver of your recording device and click **Uninstall**. Then install the new camera drivers. See the section on your recording device how to do so.

Upgrade firmware

Some recording devices may have new firmware. Check the website of the manufacturer of the recording device whether new firmware is available. Install the new firmware.

Chapter 2

Specifications



System requirements

OPERATING SYSTEM

Media Recorder 4 supports Microsoft Windows 7 64-bit Professional edition with Service Pack 1 and Windows 10 64 bit Professional edition. It has been thoroughly tested with the Windows 7 and 10 U.S. English language packs. It is possible that certain local language versions of Windows may affect how well the program runs. A quick scan was also carried out with a Windows 8.1 64-bit Professional edition.

Media Recorder is not designed for use with the Windows Touch features.

COMPUTER

Media Recorder 4 has been tested with a Dell Precision™ T5810 PC. If you order a complete solution from Noldus Information Technology, you will obtain this computer, or its successor, with Media Recorder software installed and ready to use.

Technical specifications Dell Precision™ T5810 PC:

- Processor: Intel Xeon E5-1620 v3 (Quad Core), 3.5 GHz.
- Internal memory: 8 Gb.
- Hard disk: 1 TB.
- Graphics card: 2 Gb NVIDA Quadro K620, resolution 1920 x 1200.

Media Recorder 4 has also been tested on a Dell Precision™ M4800 laptop with the following devices:

- 2 Axis M1054 IP cameras (Portable Observation Lab).
- 1 Microsoft LifeCam Studio and 1 Epiphan DVI2USB 3.0 screen capture device (Portable Usability Lab).
- 1 Basler acA1920-155um USB 3.0 camera.

Technical specifications Dell Precision™ M4800 laptop:

- Processor: Intel Core I7-4800QM (Quad core), 2.7 GHz.
- Internal memory: 8 GB.
- Hard disk: 500 GB.
- Graphics card: 2 GB NVIDA Quadro K2100M, resolution 1920x1080.

Media Recorder 4 has also been tested on a Dell Precision™ 7510 Mobile Workstation with the following devices:

- 2 Axis M1054 IP cameras (Portable Observation Lab).
- 1 Microsoft LifeCam Studio and 1 Epiphan DVI2USB 3.0 screen capture device (Portable Usability Lab).

Technical specifications Dell Precision™ 7510 Mobile Workstation:

- Processor: 6820HQ (i7 2.70GHz 4-core)
- Internal memory: 8 GB.
- Graphics card: Nvidia Quadro M1000M, 2 GB GDDR5 memory.
- Hard disk: 500 GB.

For more information on the Portable Observation Lab and Portable Usability Lab, consult the Reference Manual on the desktop of the notebook.

Supported devices

Media Recorder has extensively been tested with the following devices:

Analog cameras

Analog cameras in combination with a Euresys Picolo U4, or U8 H.264 frame grabber card.

IP cameras

- Axis P5515
- Axis M1054
- Axis P5534
- Axis M5014

USB cameras

- Microsoft LifeCam Studio USB 2.0 camera
- Basler acA1920-155um USB 3.0 camera

FireWire camera

The Imaging Source DMK 21AF04 for the DanioVision system with FireWire camera.

GigE camera

Basler acA1300-60gm monochrome camera.

Combinations

- Portable Observation Lab (two M1054 IP cameras).
- Portable Usability Lab (one Microsoft LifeCam Studio and one Epiphan DVI2USB 3.0 screen capture device).
- Stationary Usability Lab (three IP cameras and one Epiphan DVI2PCIe screen capture device).

Keyboard

CH products RS Desktop joystick for Pan, Tilt, and Zoom control of IP cameras.

Video formats

The video format Media Recorder creates, depends on the input:

- **Analog cameras -** Video files in H.264 AVC in an MPG container.
- **IP cameras** – Video files in H.264 AVC with audio in AAC in an MP4 container.
- **Other digital cameras** – Video files in MPEG-4 DivX with audio in AAC in an MP4 container.
- **Picture in Picture, or Picture by Picture; all video formats** – Video files in MPEG-4 DivX with audio in AAC in an MP4 container. See **VIDEO FILE OPTIONS** on page 43 for more information on the options Picture in Picture and Picture by Picture.

MPEG-4 DivX

MPEG-4 can achieve a high rate of compression with good quality, because it separately codes the background (which does not change much from frame to frame) from the moving parts of the video. MPEG-4 is in fact best seen as a collection of definitions rather than one fixed file format, and there are many different implementations of MPEG-4. MPEG-4 has a

higher compression rate than for example MPEG-2 and it can have much higher resolution (with Media Recorder up to 1920 x 1080 pixels).

Media Recorder creates MPEG-4 DivX video files from several digital recording devices (see above). DivX is an implementation of MPEG-4 which has both high quality and good compression. MPEG-4 DivX decoding software for playing back the video files is installed with Media Recorder.

H.264 AVC

H.264 AVC is a type of MPEG-4 and is also known under the names H.264/AVC, AVC/H.264, H.264/MPEG-4 AVC, MPEG-4/H.264 AVC, MPEG-4 Part 10 or x.264. It creates good video quality and uses previously-encoded pictures as references in a much more flexible way than in other standards, allowing the use of up to 16 reference frames. Media Recorder creates H.264 AVC video files from output of analog and IP cameras (see above). H.264 decoding software for playing back the video files is installed with Media Recorder.

VIDEO PLAYBACK

Media Recorder videos play back in Microsoft Windows Media Player if you have installed the Mainconcept decoder package from the Media Recorder installation disc. This decoder package is automatically installed when you install Media Recorder.

Videos from analog cameras

On computers with Windows 10, some Windows Media Player codecs need to be disabled to be able to play back the H.264 video files with an MPG container Media Recorder creates from analog cameras. These codecs are disabled by Media Recorder installation. De-installing Media Recorder restores the Windows Media Player codecs. Contact Noldus Support if you want to play back the videos from analog cameras on another computer than the one with Media Recorder.

Chapter 3

Installation

License key

A license for Media Recorder comes with a hardware key, which determines which license options are available to you (see **MODULES** on page 9). This is a very important piece of equipment, as it represents the full value of your license and cannot be replaced if lost. You can install Media Recorder on every computer. However, to work with the program you need to insert the license key into one of the computer's USB ports.

Please make sure that you do not lose the key! You will need to pay for a new license if so. Also be careful with the hardware key. It is sensitive and can be easily damaged.

The drivers for the license key are installed together Media Recorder. It is important to install Media Recorder with the drivers for the license key before you connect the license key to the computer. If you connect the license key first, drivers are automatically installed which leads to incorrect functioning of the license key. When the license key is installed and connected properly, a red light glows inside it.

The steps to install Media Recorder

Do not insert your license key before the installation is complete. If you do so, drivers are automatically installed, which leads to incorrect functioning of the license key. Drivers of the license key should be installed using the installation disc (see below).

Before you can start working with Media Recorder, you need to follow these steps:

1. **TURN OFF AUTOMATIC UPDATES FOR DEVICE DRIVERS** (page 17).
2. **INSTALL MEDIA RECORDER AND DEVICE DRIVERS** (page 20).
3. **INSTALL MEDIA RECORDER AND DEVICE DRIVERS** with the Media Recorder setup prerequisites (page 20).

Turn off automatic updates for device drivers

Although the general recommendation from Microsoft to use automatic updates is good, especially for security updates, automatic updates of hardware device drives can sometimes give problems. The procedure below describes how to specifically turn off the automatic updates only for device drivers. If you ordered a computer with Media Recorder from Noldus IT, the automatic updates for device drivers have already been turned off.

Windows 7

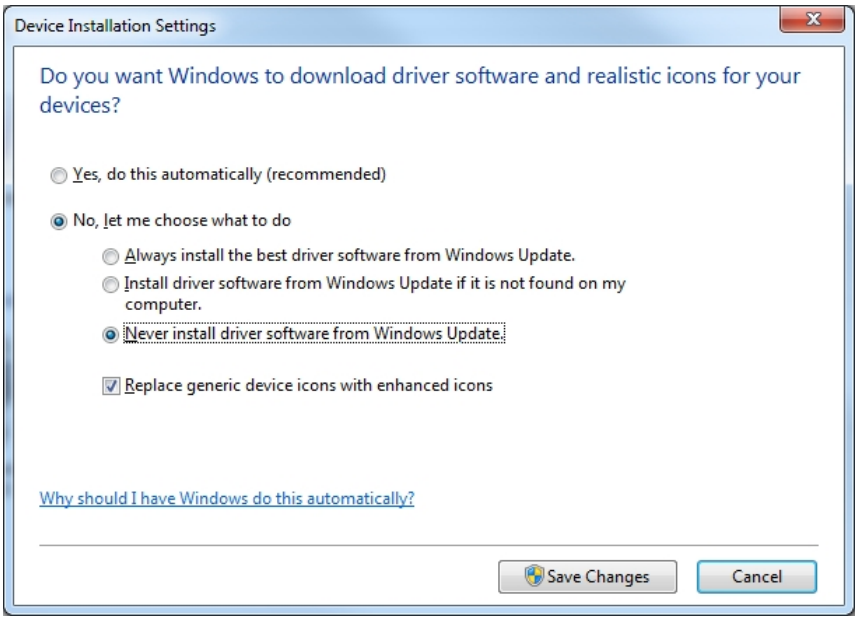
1. From the Windows **Start** menu, go to **Devices and Printers**

If you do not see **Devices and Printers**, open the Windows **Start** menu and type **Devices and Printers**.

2. Right-click the icon of your computer and select **Device installation settings**.

3. To the question **Do you want Windows to download driver software and realistic icons for your devices?**, select **No, let me choose what to do** and then

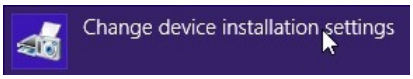
4. Select **Never install driver software from Windows Update**.



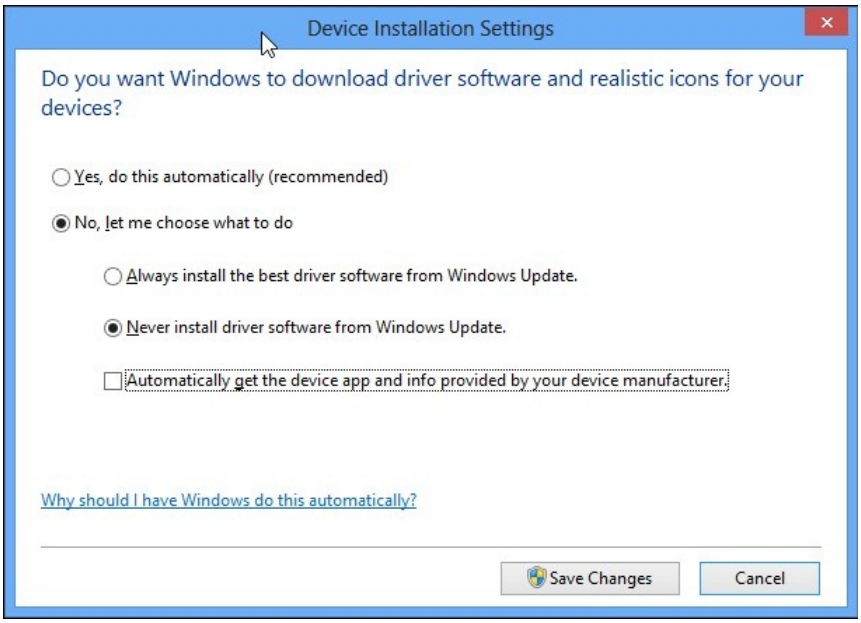
5. Click **Save Changes**.

Windows 10

1. Open the Start window and type **Change Device Installation Settings**.
2. Click the tile that appears



3. To the question **Do you want Windows to download driver software and realistic icons for your devices?**, select **No, let me choose what to do** and then
4. Select **Never install driver software from Windows Update.**
5. Also deselect the checkbox in front of **Automatically get the device app and info provided by your device manufacturer**.



6. Click **Save Changes**.

Install Media Recorder and device drivers

To start the installation of Media Recorder:

1. Insert the Media Recorder installation USB stick. Run the program **Media Recorder 4.0 Setup.exe**.

2. We recommend to choose **Standard** as Installation type. Choose **Custom** only to change the location where the program is installed, or if you do not want a shortcut to the program on the desktop or start menu.
3. In the **Drivers and tools field**, choose the driver of your video device. Choose **N-Linx agent** if you want to control recording with The Observer XT.

If you have both The Observer XT and Media Recorder, install The Observer XT first.

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4. Click **Next**, accept the License Agreement and click **Install**.

The following setup prerequisites are installed automatically before Media Recorder is installed:

- **Sentinel Run time** — Needed for correct functioning of your license key.
- **Noldus MediaLooks AV Filters 4.0** — Needed for several features of Media Recorder, like Picture-in-picture videos, synchronization of audio and video, and screen capture of the monitor of the computer with Media Recorder.
- **Noldus Mainconcept Encoder Package 7.7.10** — Needed to create MPEG-4 DivX video files.
- **Noldus MainConcept Codec Package 8.5.32**— Needed for audio encoding, MPEG-4 DivX decoding, and H.264 AVC decoding.
- **Noldus LAV audio filter 1.0.6** — Needed to play back AAC audio.
- **Microsoft .NET Framework 4.5.1** —To run Media Recorder. This program is installed only when not already present on the computer.
- **Microsoft_VC120_CRT**—To run Media Recorder.

Chapter 4

Recording devices

Recording devices

Media Recorder is supported with the following devices types. See the section on the device type which specific video device has been tested.

- **Analog cameras** (page 22).
- **IP cameras** (page 24).
- **USB cameras** (page 27).
- **The DanioVision FireWire system** (page 29).
- **GigE cameras** (page 30).
- **Screen capture devices** (page 31).

Analog cameras

WHEN DO YOU NEED AN ANALOG CAMERA?

There are circumstances in which analog cameras are a better solution than digital cameras. If cables longer than 5 m are needed between the camera and recording equipment, for most digital cameras, you need an amplifier. Industrial analog cameras are in these cases often more suitable. Cable lengths of 30-50 meter are generally no problem. An exception is GigE cameras, that also can have very long cables.

An additional advantage of analog cameras is that their signals can easily be splitted by simply splitting the cable. To split a signal from a digital camera a video splitter of video splitting software is needed.

FRAME GRABBER BOARD

Together with Media Recorder you can purchase a Euresys Picolo H.264 video capture card, to create video files in H.264/ MPEG-4 AVC format from analog videos. Since the encoding is done by the video capture card, the performance of your computer does not suffer from creating H.264 video files.

Install the board

If you bought a complete solution from Noldus IT, the frame grabber board is present in the computer. If you bought your cameras, frame grabber board and Media Recorder separately, you must install the board into your computer. See **Appendix E** on page 78.

Drivers

To install the drivers for this device, browse to the folder **Drivers and Tools\Drivers\Euresys\UxH264** on the Media Recorder installation USB stick. Run the file **picolo-u4-u8-u16-h264-win-2.5.0.139-ds-driver**.

SUPPORTED ANALOG CAMERAS

Tested cameras

- Ikegami ICD49
- Ikegami ICD49E
- The camera from the PhenoTyper Top Unit (EIA).
- The camera from the PhenoTyper Top Unit (CCIR).

CCIR is monochrome PAL and EIA is monochrome NTSC.

Maximum supported number of cameras

- Euresys Picolo U4 H.264 card – Three Ikegami ICD49 (E) or PhenoTyper Top Units (EIA/CCIR).
- Euresys Picolo U8 H.264 card. – Six Ikegami ICD49 (E) or PhenoTyper Top Units (EIA/CCIR).

You need the Additional camera module 1-6 cameras in order to record with more than four cameras simultaneously. If you have this module, you cannot select channels 4 and 8 in Media Recorder.

Processors

The Euresys Picolo U4 H.264 card has one processor and the U8 card has two processors. If you use more than three cameras per processor, the video capture card may drop frames, which can be as high as 25%. For accurate tracking in EthoVision XT, all video frames are needed. To see which card you have, count the number of cables attached to the connector. The U4 card has six cables and the U8 card has ten cables.

- U4 – Use maximally three Top Units or other analog cameras
- U8 – Use maximally six Top Units or other analog cameras. Use maximally three cameras per processor. Therefore, use the cables numbered with 1,2,3 and 5,6,7.

Audio

Media Recorder 4 is supported with analog cameras for use in EthoVision XT only. Recording audio with the Euresys Picolo H.264 card is not supported.

Supported setups

	Device	**Maximum supported frame rate (fps) ***	**Maximum supported resolution ***	**Maximum number of devices**	**Maximum supported recording time (hrs)**	**Supported on** **Desktop (D)/ Laptop (L)**	**Supported with**
	Analog PAL/CCIR Euresys Picolo U4 H.264	25	704 x 576	3	24	D	EthoVision XT no audio
	Analog NTSC/EIA Euresys Picolo U4 H.264	29.97	704 x 480	3	24	D	EthoVision XT no audio
	Analog PAL/CCIR Euresys Picolo U8 H.264	25	704 x 576	6 (cables 1,2,3, and 5,6,7)	24	D	EthoVision XT no audio
	Analog NTSC/ EIA Euresys Picolo U8 H.264	29.97	704 x 480	6 (cables 1,2,3, and 5,6,7)	24	D	EthoVision XT no audio

*Media Recorder automatically identifies the analog cameras as PAL, or CCIR (=monochrome PAL) or NTSC, or EIA (=monochrome NTSC). It selects the correct frame rate and resolution automatically.

Please note that the file size of a 24 hours recording is very large (at least 12 Gb).

Cable length

In theory, a length of 250 m should be possible, however we did not test that. We know that a length of 100 m can be used without problems.

NOTES

Fast startup

By default the computer has the option to start up fast enabled. This can sometimes cause Media Recorder to stop responding when selecting an input of the H.264 frame grabber board. Open the Control panel select **Power Options** and then **Choose what the power button does**. Click **Change settings that are currently unavailable** and finally under **Shutdown settings** deselect **Turn on fast startup (recommended)**.

IP cameras

WHEN DO YOU NEED AN IP CAMERA?

IP cameras are connected directly to a network. IP cameras are especially useful to film for example at a remote location and receive the video files through an ethernet network on your computer.

INSTALL AND SETUP

If you bought a complete solution from Noldus IT, the network adapter is present in the computer, the IP cameras are set up and the Media Recorder settings are made. If you bought your cameras and Media Recorder separately, you must do the installation and setup yourself. See **Appendix F** on page 81.

SUPPORTED IP CAMERAS

Tested cameras

- Axis P5515
- Axis P5534
- Axis M1054
- Axis M5014

Network requirements

To use Media Recorder with IP cameras, an Intel Pro/1000 CT or Intel Pro/1000 PT (1 Gb) network adapter needs to be installed in the computer. The cables must be suitable for Gigabit Ethernet. The minimum cable quality is CAT5e (https://en.wikipedia.org/wiki/Category_5_cable).

Supported setups

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Axis IP P5515	25	1920 x 1080	4	3	D	The Observer XT
	Axis IP M 5014	25	1280 x 720	1	3	D	The Observer XT
	Axis IP M1054	25	1280 x 720	8	3	D	The Observer XT
	Axis IP M1054	25	1280 x 800	2	1	L	The Observer XT
	Axis IP P5534	25	1280 x 720	1	3	D	The Observer XT
	Axis IP P5515	25	1920 x 1080	3		3	The Observer XT
	DVI2PCIe	25	1920 x 1080	1			

Cable length

In theory a cable length of 150 m should be possible. However we did not test that. We know that a setup with a cable of 1 m and an extension cable of 25 m with a switch between the cables works well with Media Recorder.

NOTES

ONVIF

ONVIF is a communication standard for network devices. ONVIF Profile S applies video and audio streaming and PTZ control. Most IP cameras nowadays support ONVIF Profile S. For cameras that do so, pan, tilt, and zoom control can be done with Media Recorder and audio from the camera can be recorded. For cameras that do not support ONVIF, pan, tilt, and zoom control must be done with a browser and audio must be recorded with a microphone connected to the sound card of the computer.

Power supply

IP cameras can be connected to a 1 Gb POE (Power Over Ethernet) or POE+ switch to supply them with power. This way no extra power cables are needed. Each device is connected to one channel on the switch. A POE switch can deliver up to 15 Watt per channel. A POE+ switch has a higher capacity per channel (up to 30 Watt per channel). Make sure that the maximum total capacity of the switch is high enough for all cameras together.

Example - you connect four cameras that need 30 Watt each to a POE+ switch. This POE+ switch must deliver at least 4 x 30 = 120 Watt.

- **Axis P5515** – requires a regular POE switch.
- **Axis M1054** – requires a regular POE switch.
- **Axis IP P5534** –requires a POE+ switch.
- **Axis M5014** – requires a regular POE switch.

USB devices

GENERAL INFORMATION ON USB DEVICES

Supported devices

The following USB devices are supported with Media Recorder:

USB cameras (see page 27)

- Microsoft LifeCam Studio.
- Basler acA1920-155um USB 3.0 camera.

Screen Capture Device (see page 31)

- Epiphan DVI2USB 3.0.

USB ports

The Microsoft LifeCam Studio is a USB 2 device and can be connected to a USB 2 or USB 3 port on your computer. The other supported USB devices are all USB 3 devices and need to be connected to a USB 3 port. You recognize these ports by a double-S in front of the USB icon.

The Dell Precision T5810 desktop PC sold by Noldus IT has both USB 2 and USB 3 ports. The Dell Precision M4800 laptop has only USB 3 ports.

USB hub

Do not connect your cameras to a USB hub. If you run short of USB connections, connect your license key, keyboard or mouse to a USB hub and connect your USB device directly to the USB port on your computer.

Hot plugging

If you disconnect a USB device and connect it to another USB port, the name is shown twice in the list of devices. This is caused by the fact that Windows treats it as a new device. In this case you have to re-select the device in the Settings window (see **The Settings window** on page 40) and reselect all settings for the device. In general we recommend not to disconnect and connect recording devices while Media Recorder is running. In addition, always connect the same USB device into the same port.

Cable length

USB devices can be connected to the computer without an amplifier with a cable of 5 m. For every subsequent 5 m an amplifier must be used. In theory, when using a standard resolution, the cables could be extended this way to 30 m. However we know that not all devices support this. Extending the standard 1 m USB cable with three 5 m cables with amplifiers works well for a Microsoft LifeCam Studio with Media Recorder.

USB cameras

WHEN DO YOU NEED A USB CAMERA?

USB cameras are very easy to use. However, the settings may limited. As an example, with many USB cameras you cannot zoom. A USB camera may be perfectly suitable for a usability study in which you film a person sitting behind a computer. A USB camera also works very well to create video files for FaceReader. For creating a video file from a person further away from your camera, a USB camera may be less suitable.

For videos with accurate time information, needed for EthoVision XT, you need a high-quality USB camera.

SUPPORTED USB CAMERAS

Tested cameras

- Microsoft LifeCam Studio
- Basler acA1920-155um

MICROSOFT LIFECAM STUDIO

To install the camera drivers

For the Microsoft LifeCam Studio USB camera, choose **Microsoft LifeCam Studio driver** in the **Drivers and Tools** field of the Media Recorder installation window. Alternatively open the Media Recorder installation USB stick and:

Windows 7 – Browse to **Drivers and Tools\Drivers\Microsoft Life Cam\Win7** and double-click the file **LifeCam 3.60.exe**.

Windows 10 – Browse to **Drivers and Tools\Drivers\Microsoft Life Cam\Win10** and double-click the file **Noldus Microsoft LifeCam Driver 4.25.529.exe**.

BASLER USB 3.0 CAMERA

USB 3.0 card

Media Recorder was tested with the following USB 3.0 interface card: U3-PCIE1XG205 -1S.

IMPORTANT If you use multiple USB 3.0 cameras, you need a USB 3.0 interface card for every camera.

If you bought the camera together with a computer from Noldus IT, this card has been installed. If you bought the camera and computer somewhere else, you need to install this card yourself.

The procedure to install the USB 3.0 card is comparable to installing a GigE card. See **INSTALL THE ETHERNET CARD** on page 93 for the full procedure. In summary:

1. Turn off your computer and all connected peripherals, such as the monitor and printer. Make sure that the computer is unplugged.
2. Remove the PC's case according to the instructions provided in the PC's user manual.

3. Select a free PCIe expansion slot, and remove the corresponding extension cover. See **INSTALL THE ETHERNET CARD** on page 93 for an overview of the properties of different slots.
4. Place the USB 3.0 into the slot, and press it carefully into position.
5. Fix the card to the chassis and re-fit the computer's cover.

To install the USB 3.0 card driver

Do this if you install the card on a computer with Windows 7.

1. Insert the Media Recorder USB stick in one of your PC's USB ports.
2. Browse to **Drivers and Tools\Drivers\Renesas 3.0 Host Controller Driver** and double-click **RENESAS-30230-setup.exe**. Follow the instructions on your screen.
3. Proceed with **To Install the USB 3.0 camera driver** below.

To Install the USB 3.0 camera driver

Choose **Basler Camera driver** in the **Drivers and Tools** field of the Media Recorder installation window.

If you already installed Media Recorder, insert the installation USB stick into the computer. Browse to **Drivers\Basler\5.0.5.8999** and double-click the file **Basler_pylon_5.0.5.8999.exe**. Follow the instructions on your screen to install the driver. During installation you are asked to choose the user profile. Select **Camera user**. Also, you must select the camera type. Select **USB**.

Settings for the USB 3.0 camera

Follow the procedure in **CONFIGURE THE CAMERA (GIGE AND USB 3.0)** on page 105 to center the camera view, and select the camera gain and exposure time.

Supported setups

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Basler USB acA1920-155um	60	1920 x 1200	1	24	D	EthoVision XT
	Basler USB acA1920-155um	60	1920 x 1200	1	10	L	EthoVision XT
	Basler USB acA1920-155um	40	1920 x 1200	4	24	D	EthoVision XT
	Microsoft LifeCam Studio	30	1280 x 720	1	1	L	The Observer XT
	Microsoft LifeCam Studio	30	1280 x 720	1	1	L	The Observer XT
	DVI2USB 3.0	30	1920 x 1200	1			

Please note that the file size of a 24 hours recording is very large (at least 12 Gb).

Please note that with multiple USB 3.0 cameras it takes a while before they become visible in Media Recorder. USB 3.0 cameras take time to initialize.

The DanioVision FireWire system

WHAT IS DANIOVISION?

The DanioVision is an observation chamber for video tracking of zebrafish larvae in well plates. The current DanioVision makes use of a GigE camera, which is supported with Media Recorder. Previous DanioVision system had an analog camera, which is supported with the Euresys Picolo H.264 frame grabber card, of a FireWire camera. Media Recorder also supports this older system with a FireWire camera.

SUPPORTED FIREWIRE CAMERA

Tested FireWire camera

The ImagingSource DMK 21AF04

Drivers

To install the camera drivers, browse to **Drivers and Tools\Drivers\The Imaging Source\4.4.0.1** on the Media Recorder installation USB stick and run the file **drvInstaller.exe**.

Supported setup

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	DanioVision FireWire	60	640 x 480	1	24	D	EthoVision XT

Please note that the file size of a 24 hours recording is very large (at least 12 Gb).

Cable length

In theory the standard cable of 4.5 m can be extended to 70 m. You need an amplifying hub for each extra 10 m. However, the option to extend the standard cable of 4.5 m with an extra cable with amplifying hub has not been tested for FireWire cameras and Media Recorder.

GigE cameras

WHEN DO YOU NEED A GIGE CAMERA?

GigE cameras are high-performance industrial cameras. They can have a higher frame rate and resolution than the other supported cameras. The images are sent unprocessed to the computer using a standard network cable (UTP). With a high frame rate and resolution this results in a very high transfer of data. You can connect a GigE camera directly to an ethernet card on your computer. In this way you can obtain very high quality videos. An important advantage of GigE cameras is the possibility to have long cables between the camera and the computer.

INSTALL AND SETUP

If you bought a complete solution from Noldus IT, the network adapter is present in the computer, the GigE cameras are set up and the Media Recorder settings are made. If you bought your cameras and Media Recorder separately, you must do the installation and setup yourself. You find the procedure in the Appendix **Set up GigE cameras** on page 93.

SUPPORTED GIGE CAMERA

Tested camera

Basler GigE cameras AC1300-60gm.

Network requirements

To use Media Recorder with GigE cameras, an Intel Pro/1000 CT or Intel Pro/1000 PT (1 Gb) network adapter needs to be installed in the computer. The cables must be suitable for Gigabit Ethernet. The minimum cable quality is CAT5e (https://en.wikipedia.org/wiki/Category_5_cable).

Supported setups

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Basler GigE AC1300-60gm	30	853 x 640	4 Picture by picture	24	D	EthoVision XT
	Basler GigE AC1300-60gm	30	1280 x 960	4 Separate video files	24	D	EthoVision XT
	Basler GigE AC1300-60gm	30	1280 x 960	1	24	D	EthoVision XT

Please note that the file size of a 24 hours recording is very large (at least 12 Gb).

Please note that with multiple GigE cameras it takes a while before they become visible in Media Recorder. GigE cameras take time to initialize.

Cable length

In theory a cable length of 150 m should be possible. However we did not test that. We know that a setup with a cable of 25 m works well with Media Recorder.

Screen capture devices

WHEN DO YOU NEED A SCREEN CAPTURE DEVICE?

You can easily follow what your test participant is doing on his or her computer with a screen capture device. This device provides you with high quality images of the screen at which the test participant is looking.

SUPPORTED SCREEN CAPTURE DEVICES

Tested devices

- **Epiphan DVI2USB 3.0** – A frame grabber device with which you connect the output of the video card of the test computer to a USB 3 port of the recording computer (see also **USB ports** on page 26). The device has inputs for VGA and DVI signals. It can be connected to a USB 2 or USB 3 port. But it can record with a higher frame rate (up to 30 fps) when connected to a USB 3 port.
- **Epiphan DVI2PCIe** – A frame grabber board that is inserted in a PCI express slot in the recording computer. The video card of the test computer is connected with a DVI cable to this frame grabber board. The DVI2PCIe has inputs for DVI, VGA and HDMI signals, but it has only been tested with DVI input. See **Install the PCIe screen capture card** on page 34 to install the card into your computer.
- **MR Screen Capture device** – A built-in screen capture device that is present if your Media Recorder license includes the MR Screen Capture Module (see page 34).

Drivers

For the Epiphan screen capture devices, use the drivers from the Media Recorder installation disc. Do not download an update of the driver from the Epiphan website! Otherwise, the screen capture devices may not work properly in combination with Media Recorder.

To install the drivers, choose **Epiphan Screen Capture driver** in the **Drivers and Tools** field of the Media Recorder installation window. Alternatively, browse to **Drivers and Tools\Drivers\Epiphan\VGA_DVI2USB\X64** on the Media Recorder installation USB stick and run the file **setup.exe**.

The built-in screen capture device does not require installation of device drivers.

Supported setups with the Epiphan devices

See page 35 for the supported setups with the MR Screen Capture Module.

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Desktop (D) Laptop (L)	Maximum supported recording time (hrs)	Supported with
	Axis IP P5515	25	1920 x 1080	3	D	3	The Observer XT
	DVI2PCIe	25	1920 x 1200	1			
	Microsoft LifeCam Studio	30	1280 x 720	1	L	1	The Observer XT
	DVI2USB 3.0	30	1920 x 1200	1			

Notes on frame rate and resolution

The actual frame rate of the recorded video is limited by the bandwidth of the screen capture device. It may be much lower than 25-30 frames per second. The DVI2PCIe can record with at least >15 fps, even at high resolution. And the DVI2USB 3 can record with at least 30 fps at high resolution.

To record enough screen detail, we recommend to use these devices at high resolution. Media Recorder supports a resolution of 1920 x 1200. However, screen capture devices by default use the resolution of the screen of the test computer. To change the recorded resolution, change the resolution of the monitor of the test computer.

Set the resolution to fixed

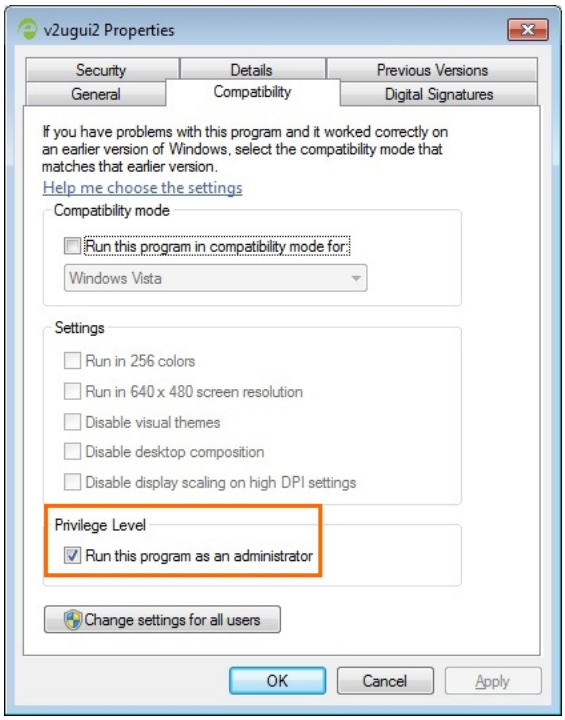
To avoid a change in resolution in the recorded video when the resolution of the test computer changes, you may want to choose a fixed resolution. With fixed resolution images from monitors with a lower or higher resolution will be scaled to the chosen resolution. This is especially useful if you record computer games, since the menu often has another resolution than the game itself. By fixing the resolution you make sure that the entire screen is recorded, even if the resolution of the test computer changes.

Select other frame rate or resolution

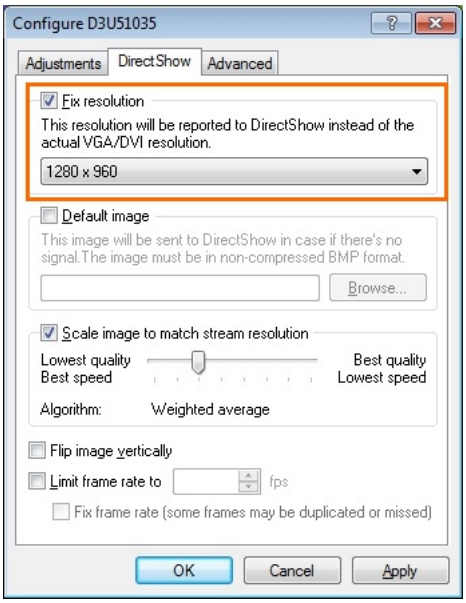
You can temporarily change the frame rate and resolution in the Advanced Video Settings of Media Recorder. However, these settings are lost if you close Media Recorder. if you want to make permanent changes, follow the procedure below.

1. Locate the executable **v2ugui2.exe**. By default this is located in the folder **C:\Program Files\Epiphan\Frame Grabber Software**.
2. Right-click it and select **Properties**.

3. Open the tab **Compatibility**. Under **Privilege level**, select the checkbox **Run this program as an administrator.** Ask you system administrator for help if you do not have administrator rights on your computer.



4. Connect the screen capture device.
5. Open the Epiphan capture tool.
6. Choose **Capture** > **Configure device**.
7. Open the tab **DirectShow**.
8. Select the checkbox next to **Fix resolution** and choose a resolution from the list.



To change the frame rate

1. Follow steps 1 to 7 above.
2. Select **Limit frame rate** to and enter the frame rate.

Cable length

USB devices can be connected to the computer without an amplifier with a cable of 5 m. For every subsequent 5 m an amplifier must be used. In theory, when using a standard resolution, the cables could be extended this way to 30 m. However this will not work with a screen capture device. We know that extending the standard 1 m cable with one 5 m cable with amplifier works well with Media Recorder.

NOTES

Audio

If you want to record audio, connect a microphone to the sound card of your computer and select that source in Media Recorder settings.

Install the PCIe screen capture card

The procedure to install the PCIe screen capture card is comparable to installing a GigE card. See **INSTALL THE ETHERNET CARD** on page 93 for the full procedure. In summary:

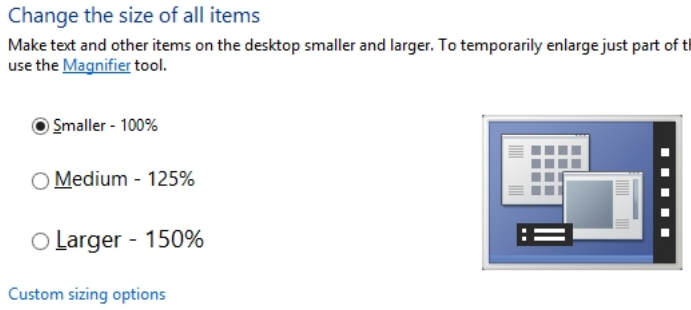
1. Turn off your computer and all connected peripherals, such as the monitor and printer. Make sure that the computer is unplugged.
2. Remove the PC's case according to the instructions provided in the PC's user manual.
3. Select a free PCIe expansion slot, and remove the corresponding extension cover. See **INSTALL THE ETHERNET CARD** on page 93 for an overview of the properties of different slots.
4. Place the screen capture card into the slot, and press it carefully into position.
5. Fix the card to the chassis and re-fit the computer's cover.

THE BUILT-IN SCREEN CAPTURE OPTION

If your license includes the MR Screen Capture Module, you can record the monitor of the computer with Media Recorder. If you want to record the screen of another computer, use an Epiphan Screen Capture Device instead.

Windows text size

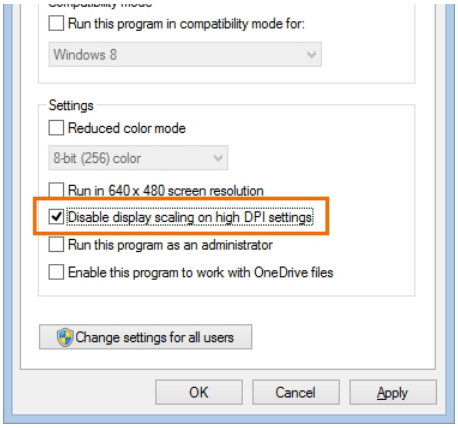
The use of built-in screen capture option is supported with a Windows text size of 100 % or 125% (**Control Panel** > **Display**).



If you change Windows text size to 125%, this may result in Media Recorder capturing only part of the screen. To solve this, do the following:

- Windows 7 – Restart the computer.
- Windows 10 –
  1. Make sure Media Recorder is not running.
  2. Open the folder **C:\Program Files (x86)\Noldus\Media Recorder 4**.
  3. Right-click the file **MediaRecorder.exe** and select **Properties**.

4. Open the **Compatibility** tab.
5. Select **Disable display scaling on high DPI settings** and click **Apply**.



Supported setups

Using the built-in screen capture is supported in the following situations:

- One monitor.
- Maximum resolution of the monitor that is recorded: 1920 x 1080.
- Laptop only.

In addition to this, the following is supported.

	Device	Maximum supported frame rate (fps)	Maximum supported resolution of the output file	Maximum number of devices	Desktop (D) Laptop (L)	Maximum supported recording time (hrs)
	Microsoft LifeCam Studio	30	1280 x 720	1	L	1
medialooks	Built-in screen capture	30	1920 x 1080	1		

To select screen capture settings

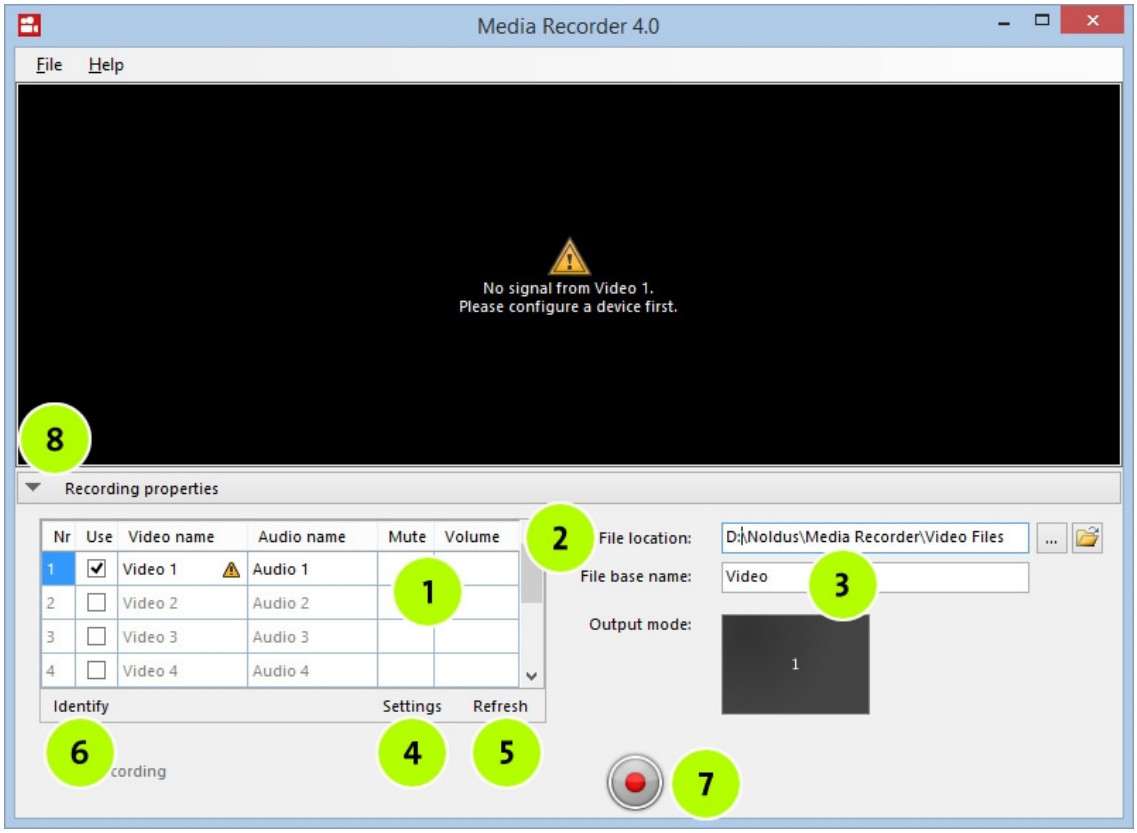
To selected screen capture settings, like the frame rate or resolution, see **USE THE BUILT-IN SCREEN CAPTURE OPTION** on page 47.

Chapter 5

Media Recorder; general procedure

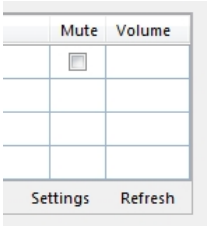
The main window

To get started, first connect your video devices and, optionally, microphones and other hardware and then start Media Recorder. The main window opens with a black screen that contains a warning triangle with the message **No signal from Video 1; Please configure a device first**. Furthermore, the table under this black screen is empty and also contains a warning triangle. This is because no video cameras are selected yet. You select the cameras in the **Settings** window (see page 40).

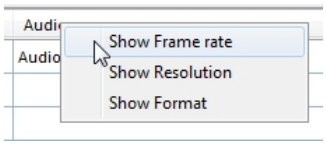


The main window of Media Recorder contains the following features:

1. **Table with cameras and settings** — This table is filled in once you selected cameras (see **SELECT A VIDEO DEVICE** on page 41). Optionally, select and deselect video sources for recording.
   Optionally, select a checkbox in the **Mute** column to mute the audio from a video source during preview. The muted audio is recorded normally in the video files.



   Optionally, show columns with the frame rate, resolution and format. To do so, right-click one of the column headers and select the preferred options.



2. **File location** — By default the video files are stored in the folder **D:\Noldus\Media Recorder\Video Files**. Optionally, use these buttons to change the location. The left button sets the folder to store the video files in, the right button opens this folder.

You must be able to write in the selected folder and there must be enough file space available (at least 500 Mb per video per hour for MPEG-4 DivX and 600 Mb per video per hour for H.264 AVC files).

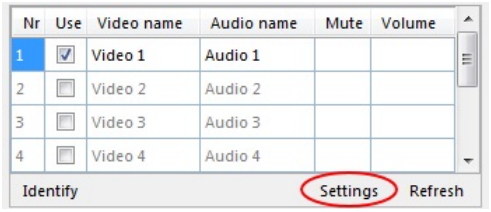
3. **File base name** — The name of the video file consists of the File base name followed by:
-the video input name.
-the date and the time the videos were recorded.
-the number of the video camera.

Example – The **File base name** is *Video*, you changed the name of *Video 1* to *Webcam* in the **Settings** window (see **The Settings window** on page 40), the date is *11 May 2016*, the time *10:54:43* and you create 2 videos simultaneously. The video name will then be:

Video Webcam 5_11_2016 10_54_43 AM 2.mp4

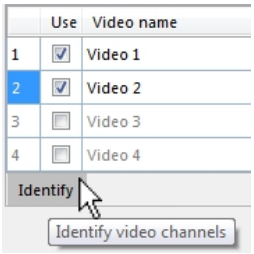
The date and time depend on your computer's regional settings. To change these, open the **Control panel** and then **Region and Language**. Select your preferences in one of the tabs.

4. **Settings button** — To select your cameras and their settings. See **The Settings window** on page 40 for further details.

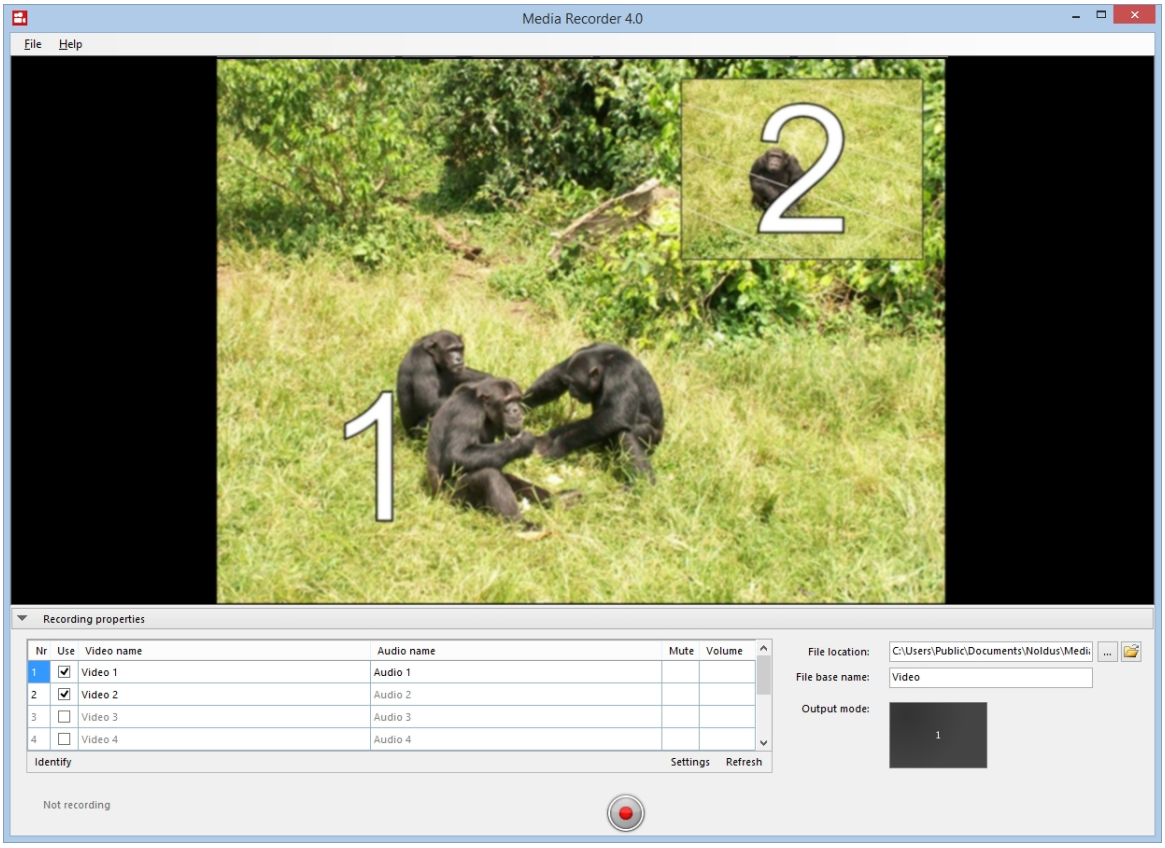


5. **Refresh button** — To show the camera signal after, for example, a temporary connection loss, or if you connected the camera after you started Media Recorder.

6. **Identify button** — To view which video number in the table corresponds with which camera source.



Result — the video numbers are superimposed on the camera images.



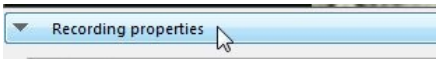
7. **Recording button**

   To start recording. You need to select all cameras first (see **SELECT A VIDEO DEVICE** on page 41).

   The button now changes into the stop recording button and the status **Not recording** in the lower-left corner of your screen changes into a timer.

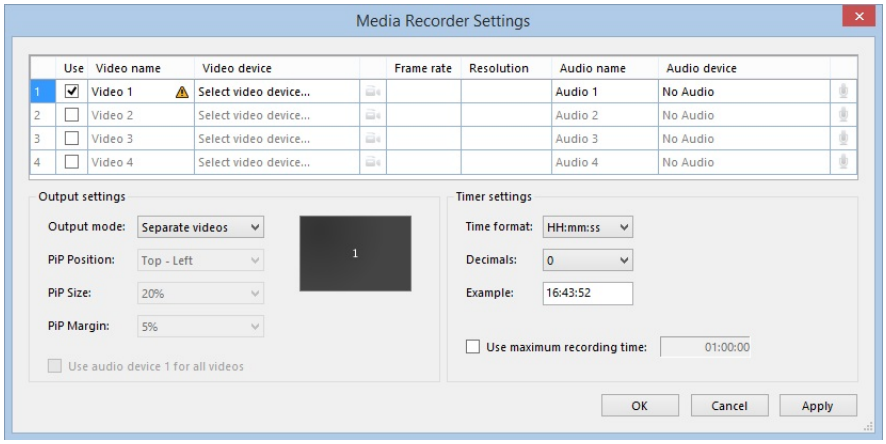
8. **Recording Properties bar** — To hide or show all the features visible under the **Preview** window.



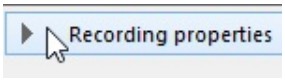
The Settings window

To select your cameras and create their settings, choose **File > Settings** or click **Settings**.

The Media Recorder Settings window opens in which you can select the cameras, microphones, settings and options for the video files.



If the **Settings** button is not visible, the recording properties may be closed. Click **Recording Properties** at the bottom of your window. By default the recording properties are open.



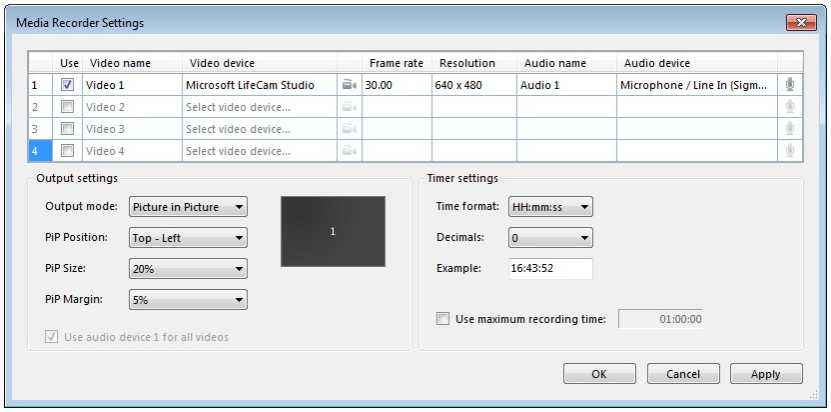
Continue with **SELECT A VIDEO DEVICE** below.

SELECT A VIDEO DEVICE

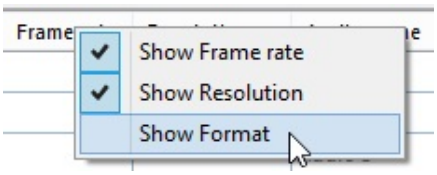
1. Select your camera from the **Video device** list.

See **Appendix F** on page 81 how to set up IP cameras and select them in Media Recorder.

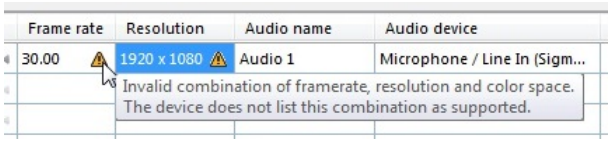
2. Select the preferred frame rate and resolution. The options depend on your type of camera.



To show and hide the columns **Frame rate** and **Resolution,** right-click a column headers and make your selection. This way you can also show the column **Format**. This column is hidden by default, because the default options are optimal. The **Format** column shows the color format of video file. See http://www.noldus.com/knowledge-base/what-color-space-format-used-media-recorder for more information on color formats.



By default, the optimal combination of frame rate and resolution for the camera is selected. If you increase the frame rate, the maximum resolution available goes down and vice versa. If you select an impossible combination of frame rate and resolution and format, Media Recorder gives a warning (see below).

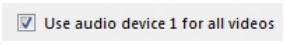


3. For advanced settings, click the video symbol next to the name of your camera. The available options depend on your camera. For some cameras you can zoom and adjust settings for brightness and contrast in this window.
4. Optionally change the names in the **Video name** column, to, for example, *Webcam*, or *IP camera*.
5. Optionally, continue with **SELECT AN AUDIO DEVICE** below.

SELECT AN AUDIO DEVICE

Audio is needed and has been tested only for cameras that are supported with The Observer XT.

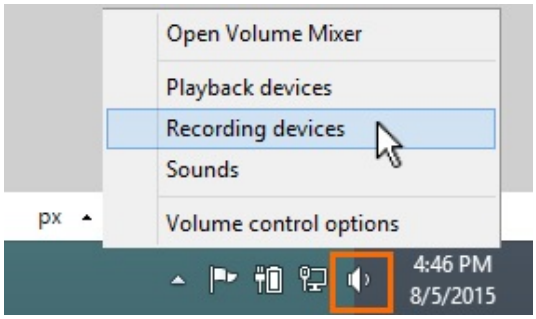
1. Select the microphones under **Audio device**. Choose between your computer microphone, a separate microphone, or the audio stream of your cameras. Choose **No audio** to not record audio.
2. Optionally record the same audio stream in all videos. To do so, select this checkbox.



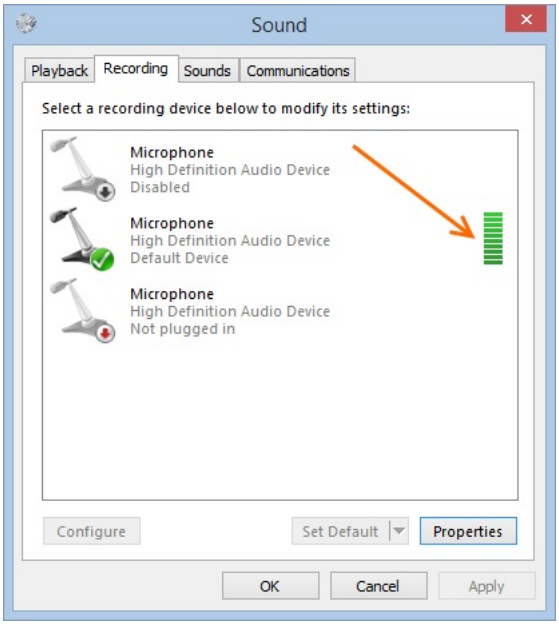
3. Click the microphone button for Audio settings.

4. The available options depend on your microphones. Move the sliders to adjust the recording volume.

   To check the recording volume, right-click the speaker icon in the bottom-right corner of your window and select **Recording devices**.



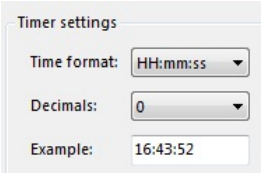
Check that the green bar is maximal when speech level is normal.



5. Optionally, change the names in the **Audio name** column.

VIDEO FILE OPTIONS

Specify the format of the recording timer.



The recording timer is present in the lower-left corner of the main window.

Optionally, set a maximum recording time.

The maximum is 99:99:59 (hr: min: sec). However, see your camera type in Chapter 4 for the supported maximum recording time.

Output settings

If you have selected more than one video source, several options are available.

- **Separate videos** — One video file for each camera.
- **Picture by Picture** — One video file with the images from each camera next or above each other. If possible, choose the same frame rate for all the videos. If you choose different frame rates the videos with the lowest frame rates may flicker and may not be suitable for use in The Observer XT, EthoVision XT, or FaceReader. The resolution of the resulting

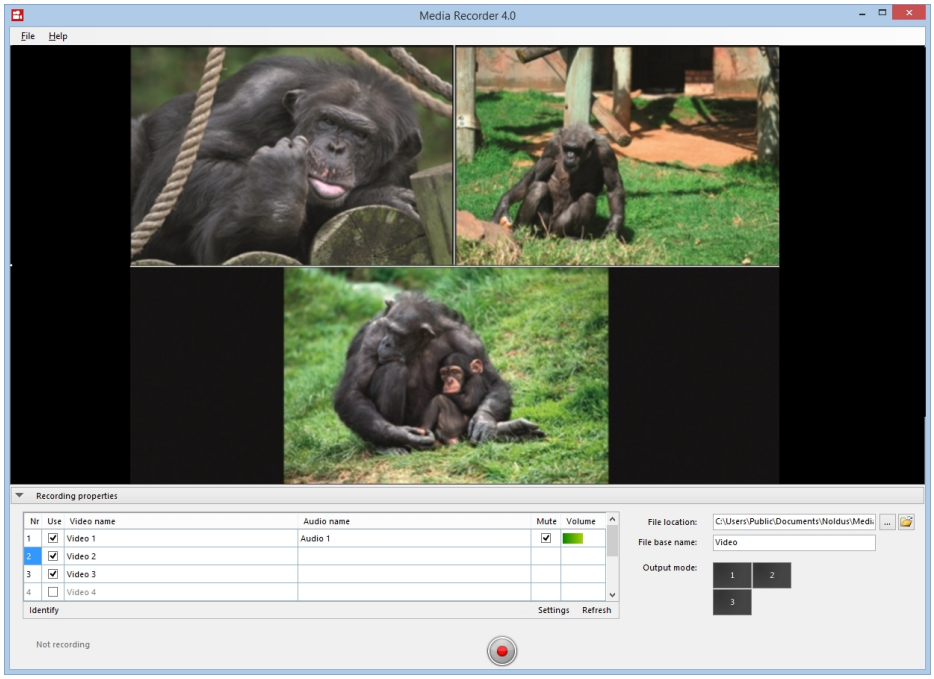
video is a sum of the separate videos, with a maximum of 1920 x 1280. See **Picture by Picture resolution** on page 111 how the resolution of the resulting video is calculated.

- **Picture in Picture** — One video file with a large image of the first camera with the images from the other cameras embedded in it. If possible, choose the same frame rate for all the videos. If you choose different frame rates the videos with the lowest frame rates may flicker and may not be suitable for use in The Observer XT, EthoVision XT, or FaceReader.

  If you select the option **Picture in Picture** the following options become available:
  - **PiP Position** — The position of the embedded images.
  - **Pip Size** — The size of the embedded images. The percentage is based on the width of the first camera image. The aspect ratios of the embedded camera images are maintained.
    Please note that if you have multiple videos in portrait format, they may overlap when you use Picture in Picture.
  - **Pip Margin** — The margin of the embedded images. When the percentage is zero, the embedded images are positioned directly on the edge of the main image. The percentage is based on the width of the first camera image.

Record

When all cameras are selected and settings are made in the **Settings** window, click **OK**. The Media Recorder main window now shows the selected cameras and microphones and a preview of the videos.



Optionally, change the order of the video cameras by dragging and dropping rows. Click the **Refresh** button after you have done this.

Press the **Start Recording** button to start a recording. The button changes into the **Stop Recording** button and the **Recording** timer starts running.

Recording stops when the maximum recording time has reached, or when you press the **Stop Recording** button.

Additional options

SAVE THE SETTINGS

The settings you create for the different cameras are automatically saved when you close Media Recorder. They are saved to the file **Current settings.mrs** that is present in the folder **D:\Noldus\Media Recorder**. These settings are used when you restart Media Recorder. To save your settings under a different name, open the **File** menu and select **Save Configuration As.....** This way you can create different settings for, for example, a webcam for the test participant's in the usability test room and an overview IP camera in a debriefing room. To open such a settings file, choose **Open configuration...** from the **File** menu.

Never shut down the computer by pressing the power button or cutting off the electricity. Your settings may become lost, even after you saved your project. Always use the Windows shut down feature to close your computer.

To restore the default settings

To go back to the default configuration, open the **File** menu and select **Open Configuration**. Browse to the file **Default Settings.mrs.** This file is read-only. You can find this file in the folder **D:\Noldus\Media Recorder.**

If you encounter problems with starting Media Recorder, for example because you created wrong settings which are loaded when you start Media Recorder, delete the file **Current settings.mrs**. Media Recorder now starts with the default settings and you can create new settings.

USE COMMAND LINES

With command lines, Media Recorder can be controlled with other programs like The Observer XT (see **Observe live and control Media Recorder** on page 50), or any other program that can send command lines, like the Windows Task Scheduler (see **Appendix D** on page 76).

1. Open **CMD** window:

- **Windows 7** - From the **Start** menu enter **cmd** in the **Start Search** field and click **Enter**.
- **Windows 10** - Type **Run** in the Start screen with tiles and click the tile **Run**. Enter **cmd** in the window that opens.

2. Type **CD C:\Program Files (x86)\Noldus\Media Recorder 4**
3. Type the command and press **Enter**.

The following actions can be controlled with commands:

- **Start Media Recorder** – MRCmd.exe (no parameter after the executable) or MRCmd.exe /E
- **Start recording** — MRCmd.exe /R
- **Stop recording** —MRCmd.exe /S
- **Close Media Recorder** — MRCmd.exe /X — Closes Media Recorder program.
- **Load a configuration file** — MRCmd.exe /C=[filename.mrs]
- **Set the file base name** — MRCmd.exe /B=[basename]

There is a space between the file name and the slash.

Delay

Allow enough time between sending the command **Start Media Recorder** and **Start Recording**. If the command **Start Recording** is sent before Media Recorder is completely open, it does not work.

There may be a delay between the command **Start Recording** and the moment the recording actually starts. This delay depends on the number of cameras, camera settings, the processor speed and programs running in the background. In the most common scenarios with Media Recorder and The Observer XT, the videos are automatically synchronized with the events. See **Synchronization of videos with events** on page 60 for more information.

Load a configuration file

The command **/C** loads a configuration file with the settings for your cameras (see **Additional options** on page 46). This is, for example, useful to open Media Recorder with the correct cameras. Make sure Media Recorder is not recording at that moment.

By default MRCmd.exe loads a file from the folder **C:\Users\Public\Public Documents\Noldus\Media Recorder**. If the file is located in another folder, you must type the full path. If the file name or the path contains spaces you must type it in between quotation marks.

Example 1 - Command for opening Media Recorder and loading the configuration file *Configuration_observation_room.mrs* that is located in the folder **C:\Users\Public\Public Documents\Noldus\Media Recorder**.

MRCmd.exe /E /C=Configuration_observation_room.mrs

Example 2 - Command for opening Media Recorder and loading the configuration file *Configuration Control Room* that is located in the folder **C:\Configuration files**

MRCmd.exe /E /C="C:\Configuration files\Configuration Control Room.mrs"

Set file base name

The command **/B** sets the File base name (see page 39).

Example - Command for opening Media Recorder and setting the File base name to *Observation room*.

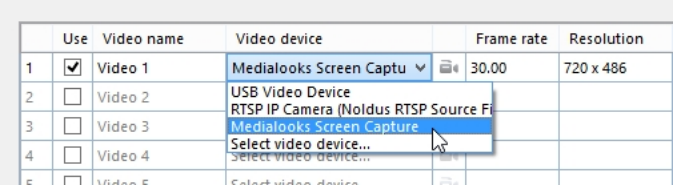
MRCmd.exe /E /B="Observation room"

USE THE BUILT-IN SCREEN CAPTURE OPTION

If your license includes the MR Screen Capture Module, you can record the monitor of the computer with Media Recorder. See **THE BUILT-IN SCREEN CAPTURE OPTION** on page 34 for the supported options.

To use the Software Screen Capture option:

1. Choose **File** > **Video Settings**.
2. From the **Video device** list, select **Medialooks Screen Capture**.

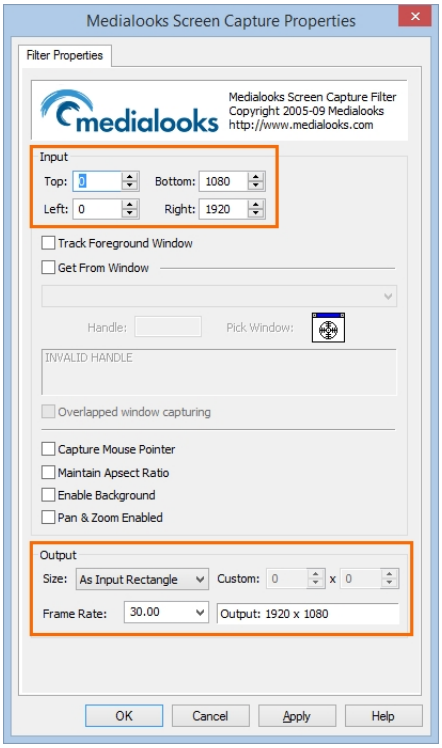


3. Click the **Advanced Video Settings** button to select recording options.

4. In the **Medialooks Screen Capture Properties** window that opens, select the frame rate and resolution in the **Output** field. See the picture on the right to use the screen capture option at full HD.

   Although you can select a high frame rate, the actual frame rate of the recording will depend on the processor speed of your computer. Most likely this will be in the order of magnitude of 10 frames per second.

5. Although this window has several recording options, the use of the built-in screen capture is designed and supported to record the full screen of the primary monitor of the Media Recorder computer only. Minimize Media Recorder after you start recording.



Disabled settings

As soon as you select the screen capture device, it is used for the video preview and you cannot change it's settings. The **Output** fields are grayed out. To enable the fields again:

1. Close the **Medialooks Screen Capture Properties** window.
2. From the **Video device** list choose **Select video device...** and click **Apply**.

3. Reselect the Medialooks Screen Capture device again and click the video icon to re-open the **Medialooks Screen Capture Properties** window (see step 3 above). You can now change the frame rate and resolution again.

Chapter 6

Media Recorder with The Observer XT

How to record video for The Observer XT

You can create videos for use in The Observer XT in two ways. You can either first create videos in Media Recorder and then observe offline in The Observer XT. You can also control video recording with commands from The Observer XT together with a live observation.

Observe offline

Offline observing in The Observer XT means carrying out an observation from prerecorded video. The video files created by Media Recorder can be used to observe offline in The Observer XT 10.0 or higher. No special settings are needed to use files from Media Recorder in The Observer XT.

Observe live and control Media Recorder

You can score live in The Observer XT and record video with Media Recorder simultaneously. The Observer XT can send commands to Media Recorder (see **USE COMMAND LINES** for an overview of the commands). This way you can start and stop recording automatically when you start and stop an observation. Besides the fact that this is convenient, the videos are also automatically synchronized with your observations when you follow this procedure.

The Observer XT can also send a command to automatically load a configuration in Media Recorder when you create a new observation, for example to select the correct IP cameras.

Observe live and control Media Recorder

The procedure to start and stop Media Recorder with commands from The Observer XT differs for The Observer XT 13 (below) and The Observer XT 12.5 or lower (page 57).

WITH THE OBSERVER XT 13 AND 14

Media Recorder 4 and The Observer XT 13 and 14 can communicate with each other with the Noldus network communication protocol N-Linx. This way you can achieve the following:

1. When you create a new Observation, Media Recorder starts and loads a configuration (see page 46).
2. When you start an Observation, Media Recorder starts recording.
3. When you stop an Observation, Media Recorder stops recording.
4. The recorded videos are automatically linked to the observation and synchronized with the events.

Opening Media Recorder requires time. When a command **Start recording** is sent before Media Recorder is open, the recording does not start. So make sure Media Recorder is open when you want to start recording.

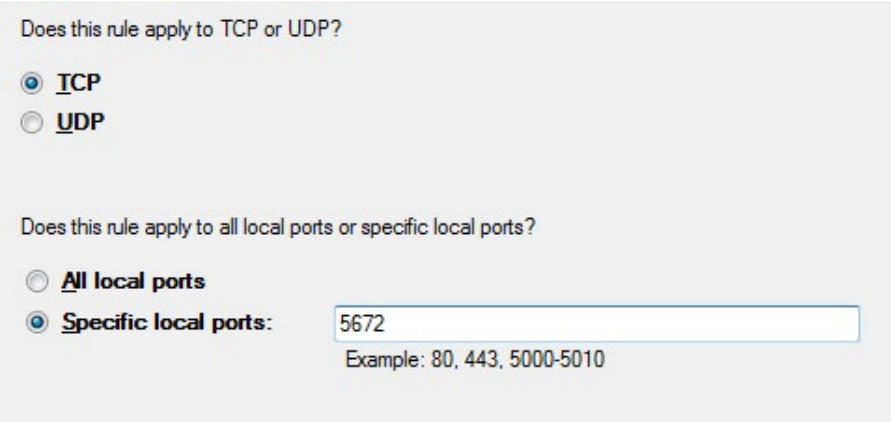
You must do the following:

1. If Media Recorder and The Observer XT run on different computers, create exceptions for port 5672 on both computers (page 51).
2. Install The Observer XT.
3. Install N-Linx agent on the computer with Media Recorder (page 51).
4. Create settings in Media Recorder (page 51).
5. Create settings in The Observer XT (page 51).
6. If Media Recorder and The Observer run on different computers, create a mapped folder on both computers where Media Recorder stores its video files (page 55).

Exceptions for N-Linx port in Windows Firewall

Follow this procedure only if Media Recorder runs on a different computer than the one with The Observer XT. Communication with N-Linx runs through port 5672 on both computers. You need to allow inbound and outbound traffic through port 5672 in Windows Firewall on both computers.

1. Open the Control Panel and select **Windows Firewall**.
2. On the left side of the window, click **Advanced Settings**.
3. Click **Inbound Rule** and click **New Rule** in the **Actions** pane.
4. In the **New Inbound Rule Wizard** Window that opens, select **Port** and click **Next**.
5. Select **TCP** and enter *5672* in the **Specific local ports** field and click **Next**.

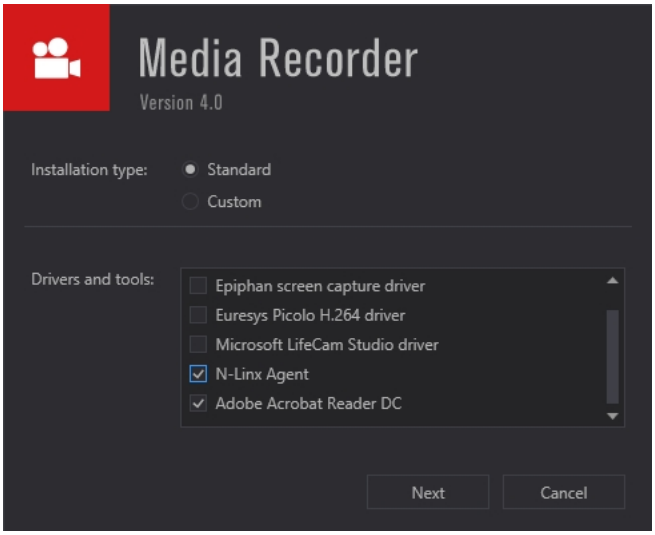


6. Click **Allow the connection** and click **Next**.
7. Select to which network the rule applies and click **Next**.
8. Give the rule a name, for example *N-Linx connection* and click **Finish**.
9. Check in the **Inbound Rules** windows that this rule is set to **Enabled**.
10. Click **Outbound Rule** and click **New Rule** in the **Actions** pane.
11. Repeat steps 4 to 9 for the outbound rule.
12. Close all Control panel windows.

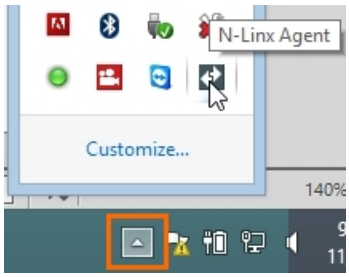
Install N-Linx agent

1. First install The Observer XT.
2. Insert the Media Recorder installation USB stick into the computer and run the file **Media Recorder 4.0 Setup. exe**.
3. In the Media Recorder installation window, choose **N-Linx agent** in the **Drivers and tools** field. If Media Recorder is installed on the computer already, choose **Modify**. Alternatively, open the folder **Drivers and Tools\Software\N-Linx Agent** and run the file **N-Linx Agent Setup.exe**.

The N-Linx agent starts Media Recorder when you create a new observation in The Observer XT.

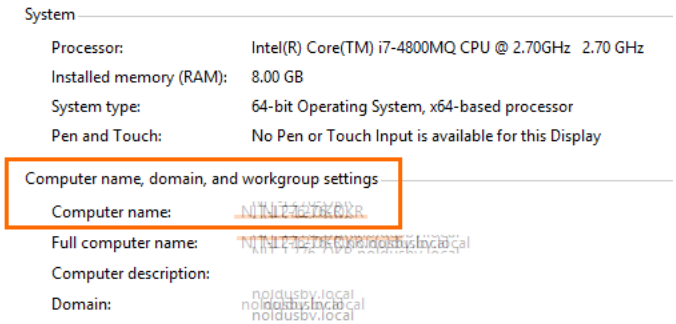


4. Follow the instructions on your screen to install Media Recorder and N-Linx agent. N-Linx agent is installed in the folder **C:\Program Files (x86)\Noldus\N-Linx Agent 1**.
5. When done, N-Linx Agent opens automatically. If not, click the arrow in the bottom-right corner of your window to open the system tray.
6. Double-click the **N-Linx Agent** icon.



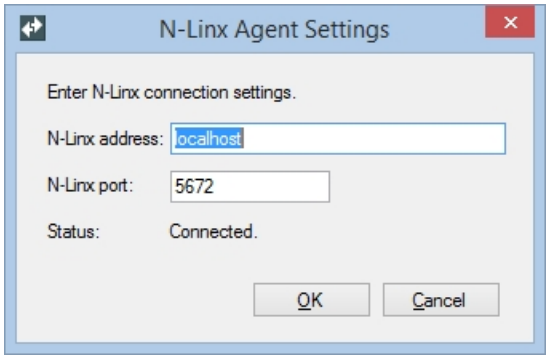
7. If Media Recorder runs on the same computer as The Observer XT, you can enter *Localhost* in the **N-Linx address** field. Leave the default port 5672, unless your system administrator tells you otherwise.

   If Media Recorder runs on another computer than The Observer XT, enter the name of the computer with The Observer XT. To find that name, open the Control Panel and choose **System**.



   You can also enter the IP address, but then the IP address of the computer with The Observer XT must be fixed. Ask your system administrator for assistance.

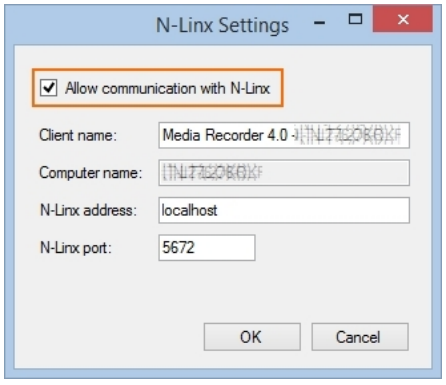
If the connection with The Observer XT computer is found, the **Status** will become **Connected** and the **N-Linx Agent Settings** window will close.



If you did not install The Observer XT yet, it will not be possible to establish a connection. Install The Observer XT and try to connect again.

Media Recorder Settings

1. In Media Recorder, choose **File** > **N-Linx settings**.

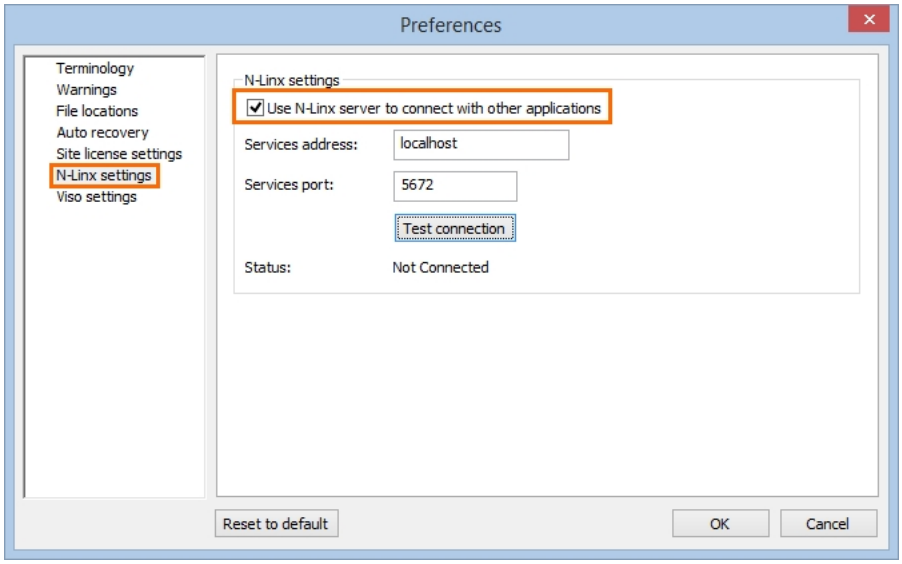


2. Select **Allow communication with N-Linx**.
3. In the **N-Linx address** field, leave the default value *Localhost* if Media Recorder runs on the same computer as The Observer XT. If both programs are on different computers, enter the computer name of the computer with The Observer XT. (see step 7 on page 52).
4. In the **N-Linx port** field, leave the default port *5672*. Ask your system administrator for assistance if this port is used by another program.
5. Click **OK**. The connection settings are tested. When the connection with the N-Linx agent is established the text **Connected** successful appears briefly and the window closes. If not, enter the correct settings and click **OK** again.

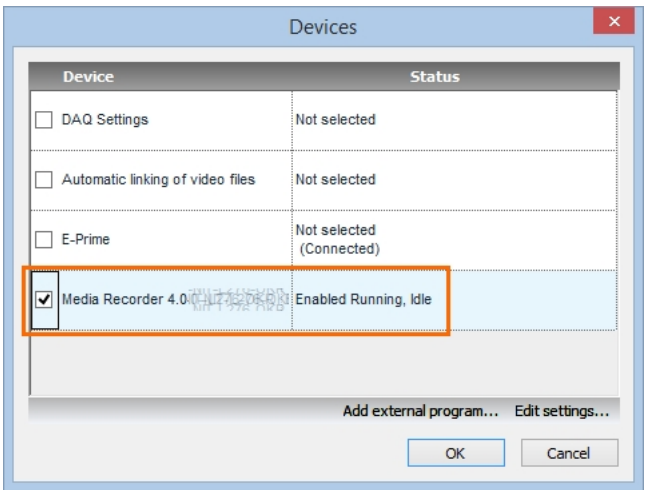
The Observer XT settings

1. Make sure that Media Recorder is open before you make these settings.
2. In The Observer XT, open your project and choose **File** > **Preferences** > **N-Linx Settings**.

3. Select **Use N-Linx server to connect with other applications**.

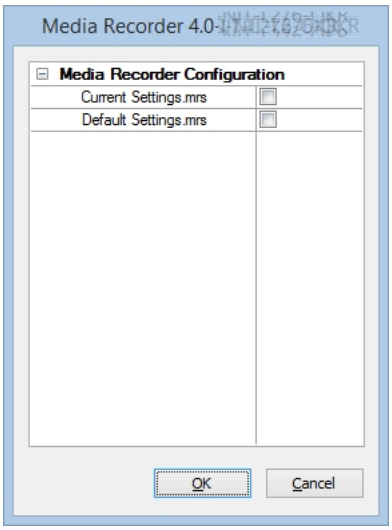


4. In the **Services address** field, leave the default value *Localhost*.
5. In the **Services port** field, leave the default port *5672*. Ask your system administrator for assistance if this port is used by another program.
6. Click **Test connection**. If connection with N-Linx is found, the **Status** will change to **Connected**. If not, enter the correct settings and click **Test connection** again.
7. Click **OK**.
8. Choose **Setup** > **Project Setup**.
9. Select **Live Observation**. The **Devices** window now opens. If not, click the **Devices** button.
10. Select **Media Recorder** and click **Edit Settings**. When you close Media Recorder, the Media Recorder line in this window will be grayed out and the status will change to **Disabled**. Media Recorder will be started when you create an observation.



11. A window with the available Media Recorder configuration files (see **Additional options** on page 46) now opens. Select the configuration file you want to use and click **OK**. If you do not select a configuration, **Current Settings.mrs** will be used

see **Additional options** on page 46). With The Observer XT, you can also enter a name in the Identify device as field. This way you can control multiple Media Recorders with The Observer XT. This is only possible with The Observer XT 14.

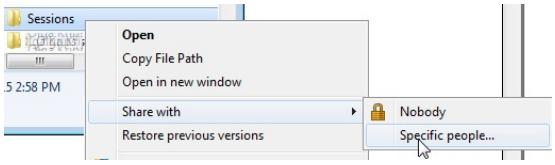


Create a mapped drive for the folder with videos

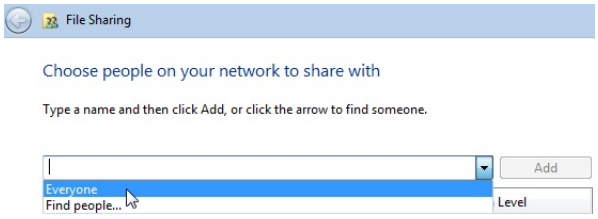
Follow this procedure only if Media Recorder and The Observer XT run on different computers.

On the computer with Media Recorder:

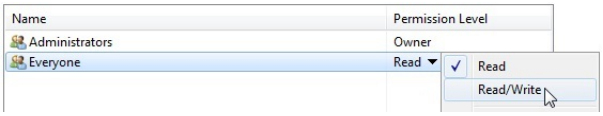
1. Right-click the folder where the video files are going to be stored, and select **Share with** and then **Specific People**.



2. Click the arrow next to **Add** and select **Everyone** and then click **Add**.



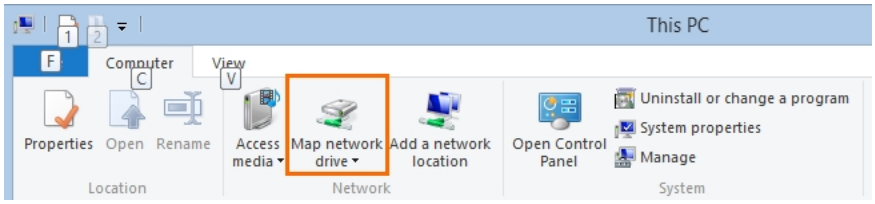
3. Select **Read/Write** as **Permission level** and click **Share** > **Done**.



On both computers:

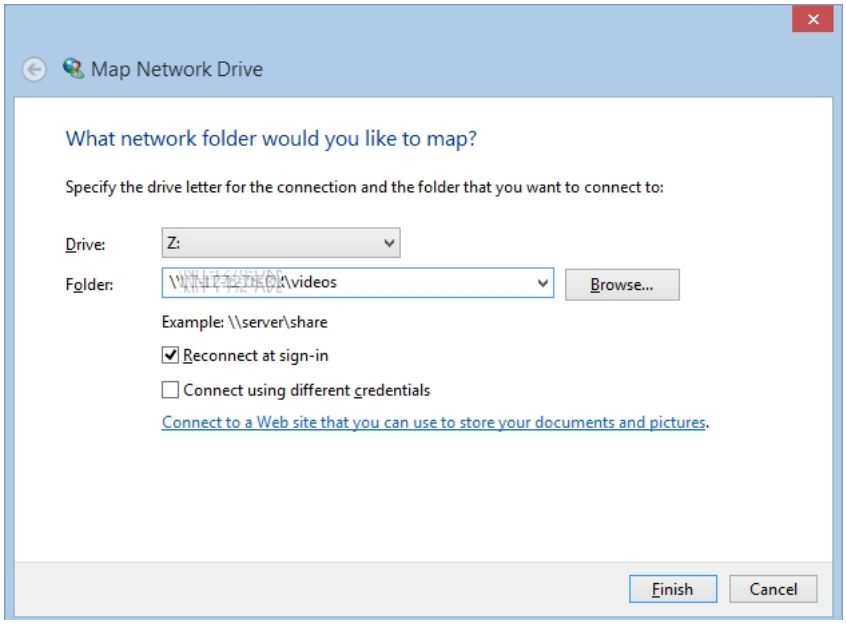
1. Open File Explorer and then **This PC**.

2. Click the **Map network drive** icon.



3. Choose a name for the drive and browse to the shared folder. Make sure this is the same on both computers. Then click **Finish**.

   If you have multiple computers with Media Recorder, repeat this procedure for each Media Recorder instance. So if you control two Media Recorders with The Observer XT, create for example a mapped drive Z and Y on the computer with The Observer XT, a mapped drive Z on one Media Recorder computer and a mapped drive Y on the other Media Recorder computer.



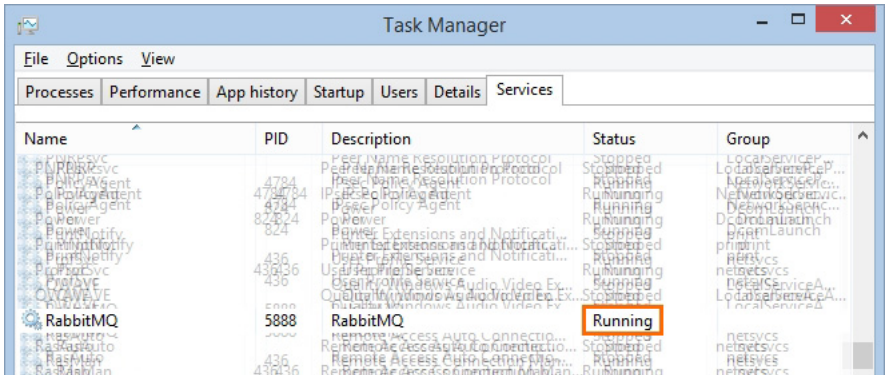
4. When you now start the computer with The Observer XT you need to enter the login details for the computer with Media Recorder.

Troubleshooting

When Media Recorder control with The Observer XT does not function properly, check the following;

- On the computer with Media Recorder, check that N-Linx agent is running. See step 6 on page 52. If there is no N-Linx agent icon in the system tray, the program is not running. Then run the file **NLinxAgent.exe** in the folder **C:\Program Files (x86)\Noldus\N-Linx Agent 1.**
- On the computer with Media Recorder, check that the status of the N-Linx agent is **Connected**. If not, follow steps 5 to 7 on page 52.
- In Media Recorder, check that the checkbox **Allow communication with N-Linx** is selected (see step 2 on page 53).
- In The Observer XT, check that **Use N-Linx server to connect with other applications** is selected (see step 3 on page 54) and that the **Status** in the window is **Connected** (see step 6 on page 54).
- In The Observer XT, check that **Media Recorder** is selected (see step 10 on page 54).
- On both computers, check that an exception is made in Windows Firewall for all inbound and outbound traffic through port 5672 (see page 51).

- On the computer with The Observer XT, check that RabbitMQ is running. To do so, press **Ctrl** + **Shift** + **Esc** and open the **Services** tab. Locate the line **RabbitMQ** and check that the **Status** is **Running**. If not, right-click the line and select **Start**.



WITH THE OBSERVER XT 12.5 OR LOWER

The Observer XT can send commands to Media Recorder. This way you can achieve the following:

1. When you create a new Observation, Media Recorder starts. and, optionally, loads a configuration file (see page 46).
2. When you start an Observation, Media Recorder starts recording.
3. When you stop an Observation, Media Recorder stops recording.
4. The recorded videos are automatically linked to the observation.
5. If The Observer XT and Media Recorder run on the same computer, the videos are automatically synchronized with the events.

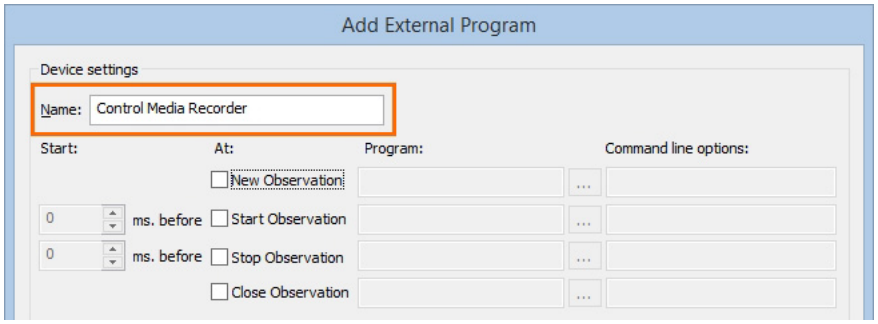
Opening Media Recorder requires time. When a command **Start recording** is sent before Media Recorder is open, the recording does not start. So make sure Media Recorder is open when you want to start recording.

You must do the following:

1. Specify Media Recorder as external device in the Observer XT (page 57).
2. Set automatic linking of video files (page 59).
3. If Media Recorder and The Observer XT run on different computers, synchronize the videos with the events (page 62).

Specify Media Recorder as external device in The Observer XT

1. In The Observer XT, choose **Setup** > **Project Setup**.
2. Under **Observation Source**, choose **Live Observation**. The **Devices** window opens. If not, click the **Devices** button.
3. Click the **Add External Program** button. In the **Add External Program** window that opens, under **Name**, type in a name for the commands (only for viewing purposes). For example, *Control Media Recorder*.



4. Select the checkbox next to **New Observation**.
5. In the same row, click the ellipsis button and browse to **C:\Program Files (x86)\Noldus\Media Recorder 4\MRCmd.exe**.

6. In the same row, leave the **Command line options** field empty. You can also type the command **/E** in this field. This results in The Observer XT starting Media Recorder, if it is not already open, when creating a new observation.
7. To load settings for your cameras automatically (see **Load a configuration file**) when you create an observation in The Observer XT, enter **/C** in the **Command line options field** for **New Observation**.
   If the configuration file is not located in the folder **C:\Users\Public\Public documents\Noldus\Media Recorder**, you must type the full path. If the file name or the path contains spaces you must type it in between quotation marks (See also **Load a configuration file**).
   Example - to open Media Recorder with the configuration *Settings IP cameras observation* room in *D:\Noldus\Media Recorder 4*:
   Enter the command:
   /E /C="D:\Noldus\Media Recorder 4\Settings IP cameras observation.mrs"

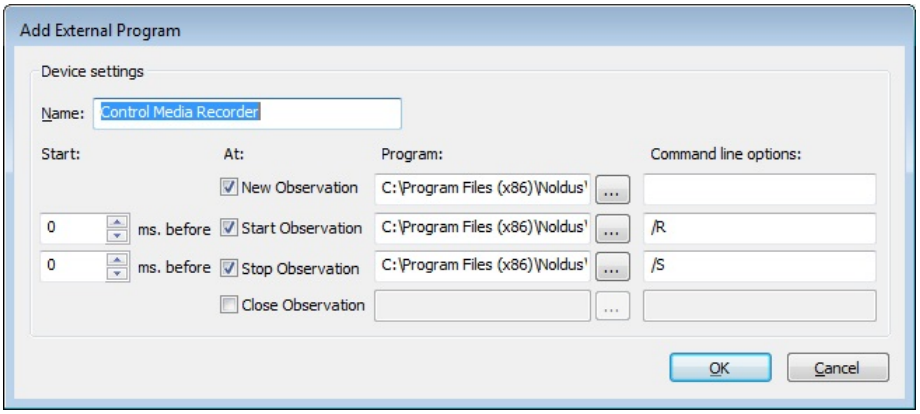
Use this option to, for example, switch between a webcam and an IP camera. Make separate device settings in The Observer XT for each configuration. Select the appropriate checkbox in the Devices window (see the picture below) before starting a new observation. Make sure Media Recorder is not recording when you load a new configuration by starting a new observation in The Observer XT. Also make sure Media Recorder is fully open before you start a new observation.

---

8. Select the **Start observation** checkbox.
9. In the same row, click the ellipsis button and browse to **C:\Program Files (x86)\Noldus\Media Recorder 4\MRCmd.exe**.
10. In the same row, type the command **/R** in the **Command line options** field. This way recording starts when you start an observation in The Observer XT.
11. Select the **Stop observation** checkbox.
12. In the same row, click the ellipsis button and browse to **C:\Program Files (x86)\Noldus\Media Recorder 4\MRCmd.exe**.
13. In the same row, type the command **/S** in the **Command line options** field. This way recording stops when you stop an observation in The Observer XT.
14. If you have The Observer XT 11.5 or higher, leave the fields in front of **ms before** at the default value *0*. The videos are automatically synchronized with the events in The Observer XT.

    If you have an older version of The Observer XT, enter the delay between the moment The Observer XT sends the command and the moment Media Recorder starts or stops recording. See **Determine the time difference between video and events** on page 62 how to determine this delay.

The **Add External Program** window will look like this:



15. Click **OK**. A new row *Control Media Recorder* appears in the **Devices** window.

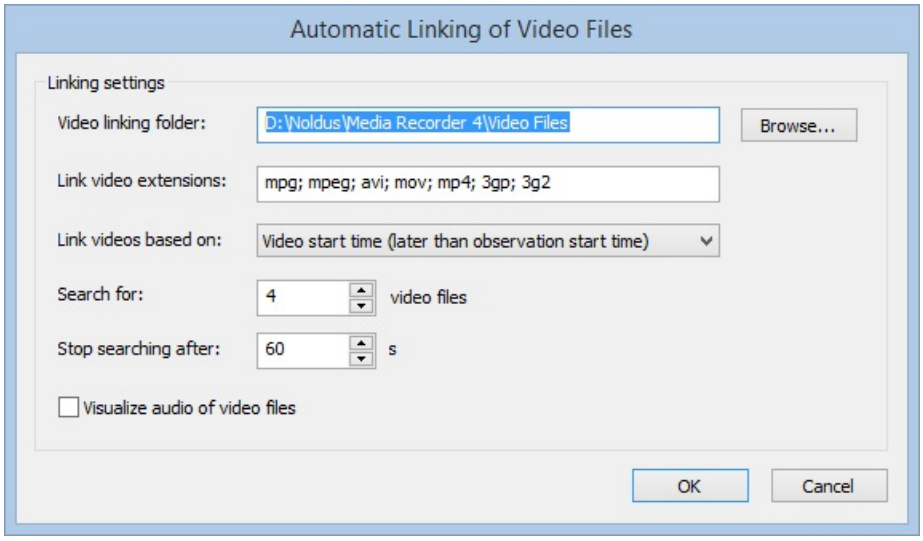
If The Observer XT and Media Recorder run on different computers, use the program PsExec to send the commands from The Observer XT across a network. See the Technical Note Using PsExec with Noldus products for the procedure. You can download this technical note from www.noldus.com/downloads.

Specify automatic linking of video files

1. Select **Automatic linking of video files** in the **Devices** window.

2. The **Automatic Linking of Video Files** window opens. If not, click **Edit settings**.
3. **Video linking folder** – Browse to the folder where Media Recorder stores its video files. By default, the media folder of The Observer XT is selected. However this is not the default folder to which Media Recorder saves its media files. Media Recorder saves its files by default in the folder **D:\Noldus\Media Recorder\Video Files**
4. **Link video extensions** – Make sure that ***.mp4** and ***.mpg** are included.
5. **Link video based on** – Choose **Video start time (later than observation start time)**. This lets The Observer XT search for video files that are saved after the observation start time.
6. **Search for** – Specify here the number of video files Media Recorder creates simultaneously in one session.
7. **Stop searching after** – Specify here the time The Observer XT should look for new media files. Maximum time is 600 seconds.
8. **Visualize audio of video files** –To view the audio stream of the video files as waveforms.

The **Automatic Linking of Video Files** window will look like this:



Make sure the **Automatic linking of video files** option and the External command option are selected in the **Devices** window.

Carry out an observation (see Chapter 4 of The Observer XT Reference Manual). After you stop the observation, the videos are imported into the observation and synchronized.

Opening Media Recorder requires time. When a command **Start recording** is sent before Media Recorder is open, the recording does not start. So make sure Media Recorder is open when you want to start recording.

Synchronization of videos with events

Videos created by Media Recorder are automatically synchronized with the events in The Observer XT in the following situations:

- You use Media Recorder 4 and The Observer XT 13 and follow the procedure on page 50.
- You use Media Recorder 4 and The Observer XT 11.5, 12.0 or 12.5, and you follow the procedure on page 57.

In these situations an automatic offset is applied to the videos. See page 61 how to view this offset.

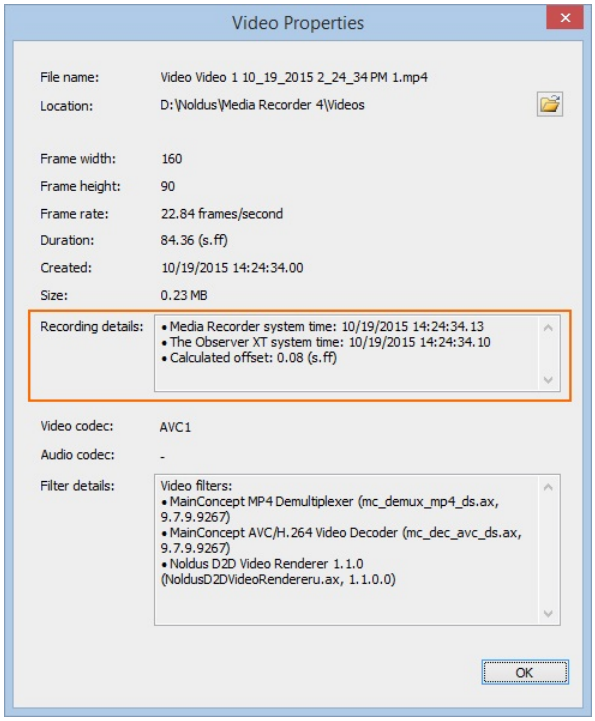
You need to synchronize videos and events manually in the following situations:

- You start video recording manually and import the videos into The Observer XT.
- You control Media Recorder with commands from The Observer XT 11.0 or an older version.

See page 62 how to synchronize videos and events manually.

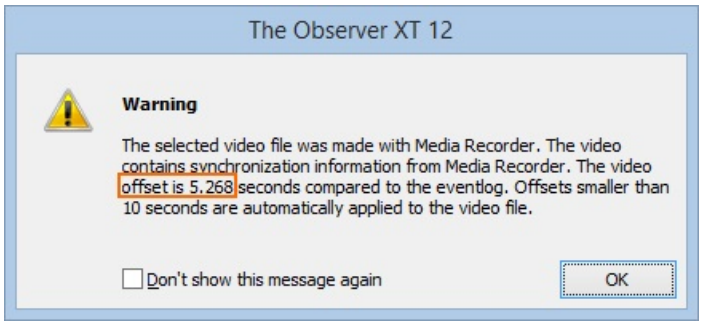
VIEW THE AUTOMATIC OFFSET

To view the Media Recorder and The Observer XT time information and the automatic offset, right-click the video in The Observer XT and choose **Properties**, The offset is used for automatic synchronization.

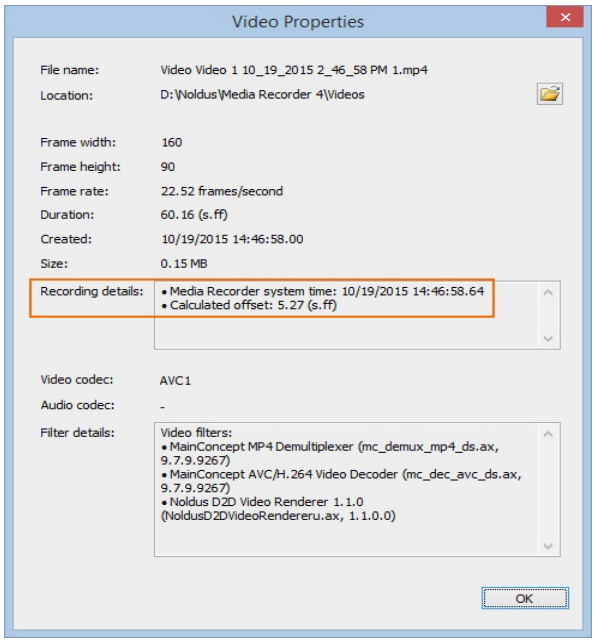


If you start recording manually within 10 seconds after observation start

If use The Observer XT 11.5 or higher and you start Media Recorder manually within 10 seconds after the observation starts, an offset is automatically set when you import the videos. A message with the calculated offset is shown.



If you right-click the video in The Observer XT, the offset is also shown next to **Recording details** in the **Video Properties** window that opens.



However, there can still be up to 1 second asynchronism between the observation and the video files. If that is a problem for the accuracy of your experiments, fine-tune the synchronization, following the procedure described below.

Synchronize manually

To synchronize videos and events manually, first determine the time difference and then apply an offset.

Determine the time difference between video and events

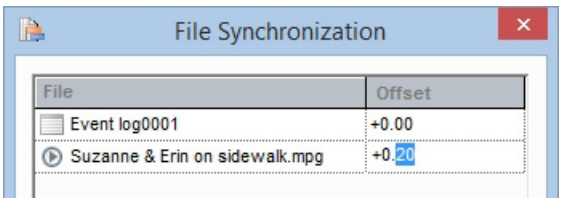
Make sure an event is recognizable in the videos and the event log. For example create a dummy behavior with a key code in the coding scheme. Carry out an observation and simultaneously record a video or the keyboard. Press the key of the dummy behavior. The event is recorded in the Event log and is visible in the video.

Open the observation and scroll to the recognizable event in the video. Note the time difference of the event in the video and the event log.

Apply offset

1. In The Observer XT, open the observation and click the **Offset** button on the toolbar.

2. Select **Numerical Offset** to open the **File Synchronization** window.



3. Set the time difference in the **Offset** cell. For example, if the video started 0.2 seconds before the observation, enter 0.20 seconds in the **Offset** field of the video.

You can also use the SyncBox to assess the delay (see the Technical Note - The SyncBox - The Observer XT for more information).

Chapter 7

Media Recorder with EthoVision XT

Media Recorder videos in EthoVision XT

TRACK FROM VIDEO FILE

Tracking from video file in EthoVision XT means acquiring tracks from prerecorded video. Media Recorder video files can be used to track **From Video File** in EthoVision XT as long as you use supported cameras. When you use analog cameras, you must adjust the aspect ratio. For digital cameras that are not supported this may also be necessary. See the **ADJUST THE VIDEO ASPECT RATIO** below.

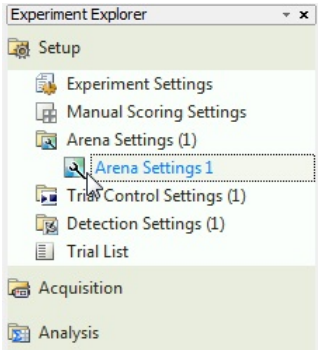
EthoVision XT can also send commands to start and stop recording with Media Recorder (see **Control Media Recorder with Ethovision XT** on page 66).

In principle you can create video files from many different digital cameras with Media Recorder. However, the quality of the digital camera is essential for accurate tracking. If you use other hardware or cameras than the supported ones, you need to check whether the time information in the video files is correct. See **APPENDIX C** on page 75 how to do this.

ADJUST THE VIDEO ASPECT RATIO

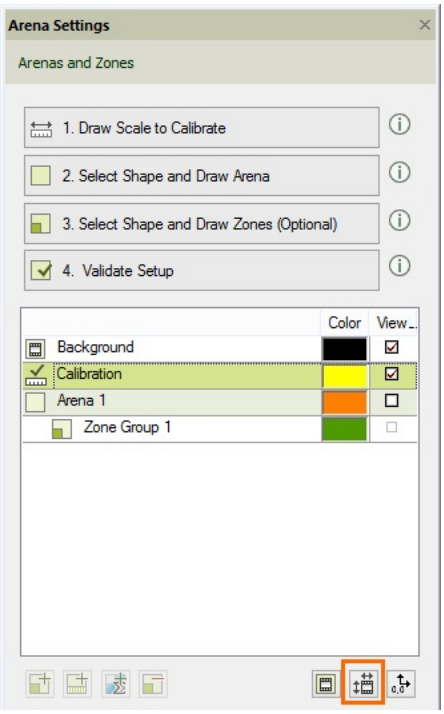
1. In the **EthoVision XT** choose **Setup** > **Experiment Settings**.
2. Choose **From Video File** as your **Video Source**. You find more information on how to make **Experiment Settings** in chapter 5 of the EthoVision XT Reference Manual.

3. Choose **Setup** > **Arena settings**, or click the desired **Arena Settings** in the Experiment Explorer.



4. Browse to your video file and grab a background image for your arena. See chapter 6 of the EthoVision XT Reference Manual for information on how to do this, and for more information on how to make **Arena Settings**.

5. Click the **Adjust Aspect Ratio** button.



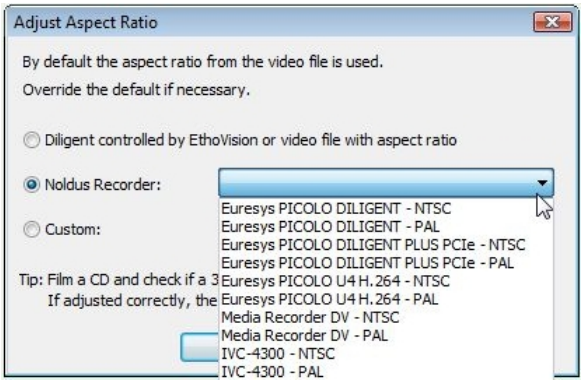
6. Depending on whether you use an analog, or a digital camera, the procedure differs. See **Digital cameras** on page 65 or **Analog cameras** on page 65.

Digital cameras

For the supported cameras, leave the default option **Diligent controlled by EthoVision or video file with aspect ratio** selected. For other digital cameras you may need to adjust the aspect ratio. See the section **The video aspect ratio** in the EthoVision XT Reference Manual for details.

Analog cameras

In the **Adjust Aspect Ratio** window choose **Noldus Recorder** and click the dropdown list. Choose:



- **Euresys PICOLO U4 H.264 – NTSC** — For analog NTSC cameras. NTSC cameras are found in North and Central America, together with parts of Asia.
- **Euresys PICOLO U4 H.264 – PAL** — For analog PAL cameras. PAL cameras are found in Europe and the rest of the world, except for North and Central America, together with parts of Asia.

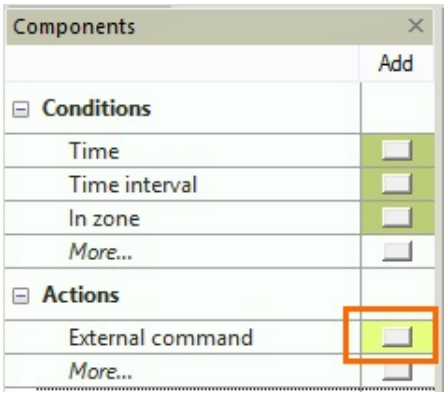
The other options do not apply for video files created with Media Recorder.

Control Media Recorder with Ethovision XT

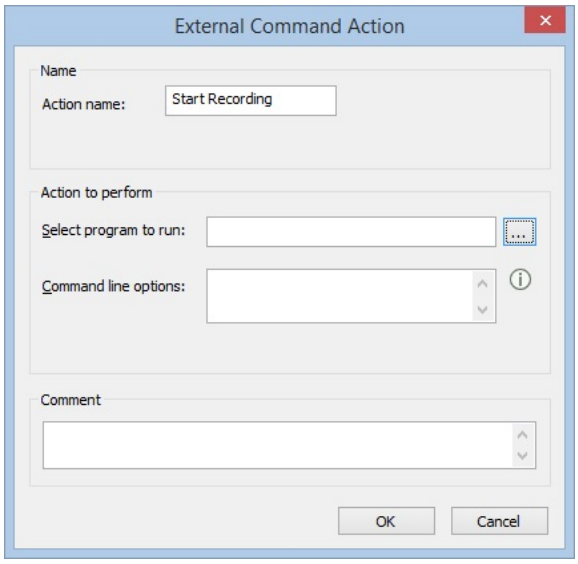
To control Media Recorder with commands from EthoVision XT, select **MRCmd.exe** as external program in the Trial Control Settings and specify the command. See **USE COMMAND LINES** on page 46 for an overview of the available commands.

To track live in EthoVision XT and record with Media Recorder simultaneously, you either need two cameras, or have an analog camera connected to two channels of the Euresys Picolo H.264 card.

1. Open the Trial Control screen by clicking the Trial Control Settings in the Experiment Explorer. For an extensive description of how to use Trial Control, see chapter 7 of the EthoVision XT Reference Manual or the Trial and Hardware Control - EthoVision XT Reference Manual.
2. In the **Components** pane, under **Actions** click the button next to **External command**.



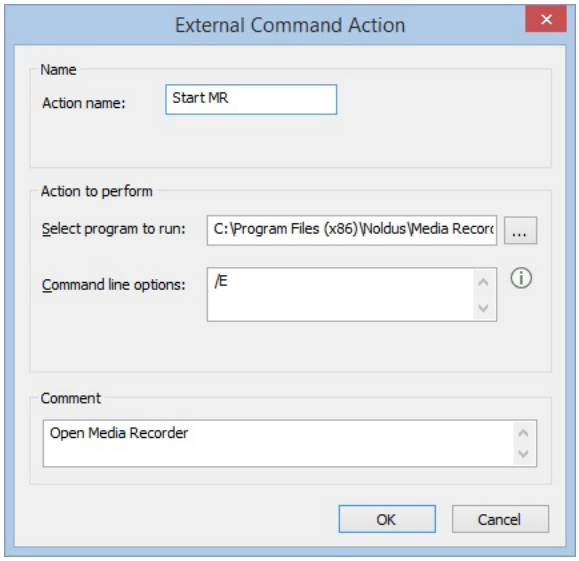
3. Enter a name in the **Action Name** field, for example, *Start Recording*.



4. Under **Actions to perform**, click the ellipsis button and browse to **MRCmd.exe**. By default **MRCmd.exe** is present in the folder **C:\Program Files (x86)\Noldus\Media Recorder 4\MRCmd.exe**.

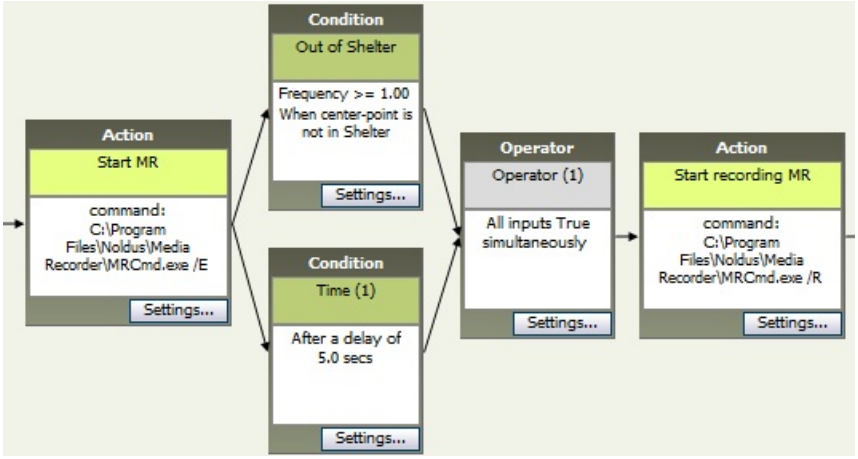
5. Enter one of the commands that are available for Media Recorder (**/E**, **/R**, **/S**, **/X** or no command) as a **Command line option**.
   Example - You carry out live tracking during a 24-hour period and you want to make a recording in Media Recorder but only when the animal leaves the shelter.

6. Create an external command condition with the command **/E** to start Media Recorder.



7. Insert a Condition *Out of shelter.* Combine this condition box with a **Time** condition, because opening Media Recorder takes a few seconds. With a **Time** condition you make sure that Media Recorder is open before recording starts (see the figure below for an example).

8. Insert an **External command** box with the command **/R** to start recording.



Example of the External command action to start a recording with Media Recorder when the animal leaves a shelter. The left Start MR action box starts up Media Recorder. The Start recording MR action box on the right starts the recording when both the 'Out of Shelter' and 'Time(1)' conditions are true, that is, the center-point of the animal has left the shelter at least 5 seconds after Media Recorder was started.

9. Similarly, you can stop recording (**Command line option**: **/S**) when the animal enters the shelter again.

Opening Media Recorder program takes time. When a command **Start recording** is sent before Media Recorder program is open, the recording does not start. So make sure Media Recorder program is open when you want to start recording.

There also may be a delay between the command **Start Recording** and the moment Media Recorder actually starts recording. This delay results in missed frames at the beginning of the video file. Run a test recording to test how long this delay is. To assess this delay, make for example a video of a digital clock and compare the time the command **Start Recording** is given with the time at the first frame of the video.

Settings for DanioVision video recordings

AIM

To improve the quality of video recorded, if the current quality is insufficient to track a large number of very small animals.

BACKGROUND

Video tracking zebrafish larvae in 96 well plates works with a relatively low number of pixels per animal that may not contrast much with the background. For accurate tracking, a very good quality video is needed.

The default settings for encoding video with Media Recorder ensure very good quality video. However, for video tracking of zebrafish larvae with a DanioVision Observation Chamber, this quality may still not be good enough. This quality can be further improved by adjusting compression settings for MPEG-4 recording in the Windows registry. Please note that this gives a lower compression and, therefore, a much larger video file size. The file size can be ten times as large as with the default quality settings.

PROCEDURE

You can change the quality settings in the Windows registry. To do so, run the file **MCMPEG4EncQ33G15.reg**. This file is present on the Media Recorder installation USB stick in the following folder:

Drivers and tools\Software\DanioVision

You can also download the file from the Media Recorder 4 section of www.noldus/downloads.

This adds the following registry entry:

- [HKEY_CURRENT_USER\Software\MainConcept\MainConcept MPEG-4 Video Encoder]

  "[RC] Quantizer for I-Frame"=dword:00000003

  "[RC] Quantizer for P-Frame"=dword:00000003

  "[GOP] Gop length"=dword:0000000f

It sets the following settings for MPEG-4 recording:

- GOP Size = 15
- Quantizer for I-frame = 3
- Quantizer for P-frame = 3

To restore the default settings:

Run the file **MCMPEG4EncOrig.reg** that you find in the same folder as mentioned above. The default settings are:

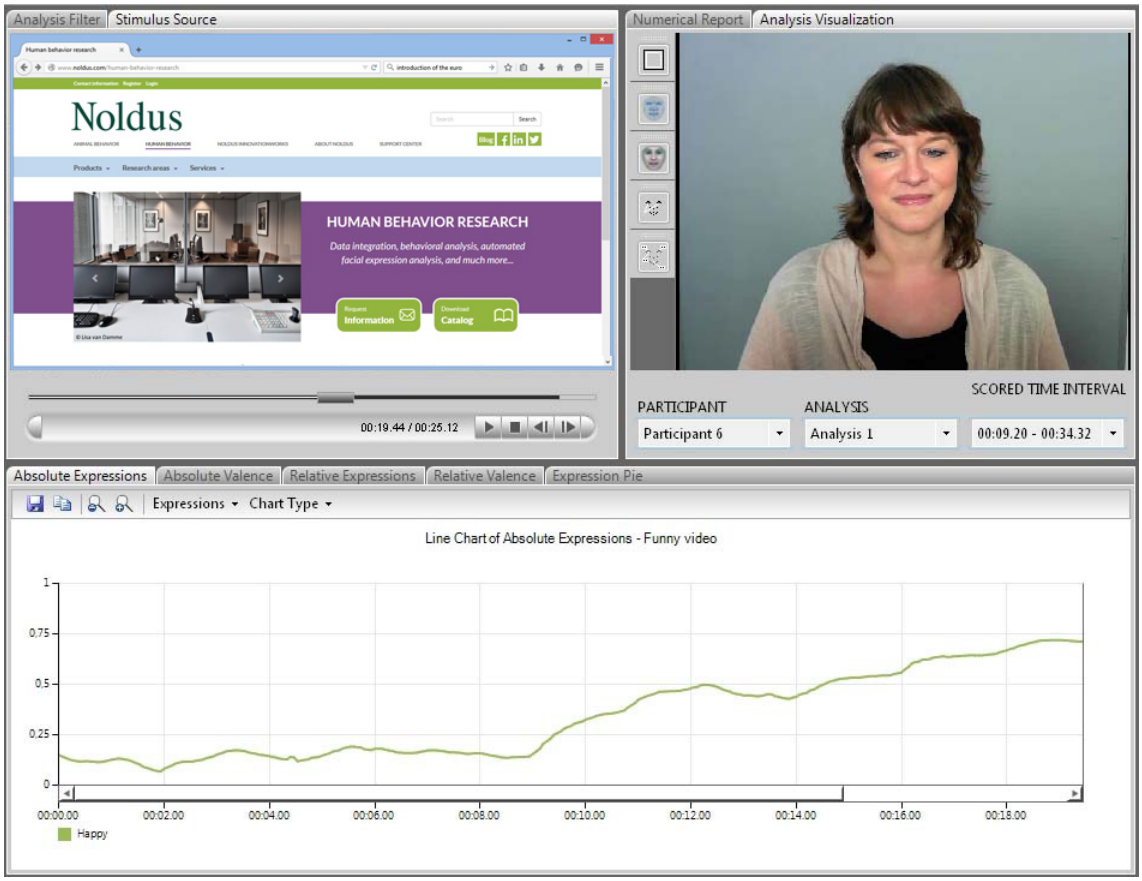
- GOP Size = 15
- Quantizer for I-frame = 4
- Quantizer for P-frame = 8

Chapter 8

Media Recorder with FaceReader

Offline video analysis in FaceReader means analyzing prerecorded videos. The videos created by Media Recorder can be used for offline video analysis in FaceReader 4 or higher. No special settings are needed to use files from Media Recorder in FaceReader.

You cannot simultaneously analyze live video signals in FaceReader and create video files in Media Recorder. If you want to analyze and record videos simultaneously, record the videos in FaceReader.



Appendix A

Troubleshooting

If you are having problems, please first read **Requirements of a custom computer** on page 73, to check that your system is suitable for using Media Recorder. This appendix contains troubleshooting items for the following cases.

- **NO VIDEO PREVIEW** (page 70).
- **SOUND PROBLEMS** (page 70).
- **INSUFFICIENT DISC SPACE** (page 71).
- **SYNCHRONIZATION PROBLEMS** (page 71)
- It also contains information on:
- **TOOLS FOR TROUBLESHOOTING** (page 71).
- **HELP MENU** (page 71).
- **TECHNICAL SUPPORT** (page 72).

NO VIDEO PREVIEW

If one of your video inputs is black with a warning triangle and the message like **Error detected with Video 1** is shown, the video source was not turned on when Media Recorder was started. Press the **Refresh** button in Media Recorder to show the image from that camera. You also get a black screen with a warning triangle when you have not yet selected this camera in Media Recorder **Settings** window (see **SELECT A VIDEO DEVICE** on page 41 for details).

BAD VIDEO QUALITY

If you split the input of one analog camera and connect them to two video channels on the Picolo H.264 encoder board, it may happen that one or more of the camera images is very bad quality. See **SET DIP SWITCHES (ONLY IF YOU TRACK LIVE AND RECORD VIDEO SIMULTANEOUSLY IN MEDIARECORDER)** on page 78 for the solution.

INSTALLATION PROBLEMS

If you get an error message during installation of the Picolo U4, or U8 H.264 card, it is most likely that the card is not correctly inserted into your computer. Turn the computer off and disconnect the power cable. Press the card gently but firmly into place.

SOUND PROBLEMS

If you are playing back multiple videos in The Observer XT and you hear an echo on the sound track, turn the sound off on all but one of the video monitors.

If you hear no sound on your recording this could be because:

- The speakers of your computer are not plugged in, turned off or their volume is low.
- The Windows volume control is muted or turned low.
- You have selected **Line -in** for your audio device instead of **Microphone**.
- You do not have an audio source connected.

INSUFFICIENT DISC SPACE

If your output folder is on the C: drive it is possible that you will have insufficient file space. Most computers are configured with more file space on the D: drive, so select your output folder on the D: drive.

SYNCHRONIZATION PROBLEMS

- If you have multiple videos that do not seem to be synchronized, use the offset function in The Observer XT to synchronize. If you send commands with The Observer XT to start and stop recording, the videos are automatically synchronized.
- If you miss frames at the beginning of your video when you sent commands to the Media Recorder with EthoVision XT, this is because of a delay in starting the actual recording with The Media Recorder. To assess this delay, make for example a video of a digital clock and compare the time the command "Start Recording" is given with the time at the first frame of the video.

TOOLS FOR TROUBLESHOOTING

Videoinspector

This free tool (http://www.kcsoftwares.com/?vtb) gives basic information about the video files you are trying to play (such as which codecs they were made with) and report which codecs are installed on your computer. It is reasonably easy to use. It does not report details such as the I-frame rate.

GSpot

Although GSpot (http://gspot.headbands.com) has not been maintained since 2007, it is a powerful tool to get information about both your video file and your computer system. Gspot is a free tool. It is less easy to use than VideoInspector.

In addition to providing detailed information about the video file you have opened, G-Spot can be used to adjust how Windows uses the codecs installed. This is an advanced function and you should only use it if you understand what you are doing, and carefully write down the changes you make. If several codecs are installed which can be used to play one format, Windows assigns a 'merit' to each codec to determine its preference. You can use Gspot to change the merit of each codec and in that way select which one is used by Windows (and so by other software). This is a way in which you can solve problems of codecs conflicting with each other, e.g. a piece of software such as The Observer XT works best with a particular codec, but another installation has set the merit of an alternative codec higher.

Mediainfo

MediaInfo (http:/www.mediainfo.sourceforge.net/en) provides detailed information about media files. It has less information than GSpot, but at the publication date of this manual, it was maintained.

Windows System Information

This can be obtained in Windows with System and Security/System/Advanced System Settings, Dxdiag.exe, and the Device Manager (in the Control Panel).

For full system information, SIW is a useful tool (http://www.gtopala.com).

HELP MENU

Media Recorder's **Help** menu contains the following options:

- **Help topics** – Opens the Media Recorder Reference Manual. You can search and find help topics.
- **Noldus Online** – If your computer is connected to the Internet, you can choose this option to go to the Media Recorder home page, check for updates, contact the help desk or consult the data base of the Customer Support Center. If you encounter a problem with Media Recorder, you can inform Noldus IT with the **Report an Issue** option.
  On the Noldus web site you can also download documentation and drivers. Visit www.noldus.com/downloads. At this page you also find information about known problems and their solution.

- **Upgrade** – If you have purchased an upgrade of Media Recorder, choose this option to type the new **Upgrade Key** number that you have received from Noldus.
- **About Media Recorder**– Choose this option to see details of exactly which version of Media Recorder you are using. Click **User Info** to see the registered user and license number of your software.

TECHNICAL SUPPORT

For questions about this or any other Noldus product, please check the support database or contact the Support department (www.noldus.com/support-center). You can also contact the Support Department by opening the **Help** menu in Media Recorder, select **Noldus Online** and subsequently **Contact Help Desk**. The help desk may ask for the file **MediaRecorder.log**. You can find this file in the folder **D\Noldus\Media Recorder**.

Appendix B

Requirements of a custom computer

RECOMMENDED COMPUTER

If you order a complete solution from Noldus Information Technology, you will obtain a Dell Precision™ T5810 quad core workstation. This PC is the standard test platforms for Media Recorder, and we recommend that you use that computer. Media Recorder 4 is also used in the Portable Observation Lab and the Portable Usability Lab with a Dell Precision™ 7510 quad core mobile workstation (or its successor). See **COMPUTER** on page 13 for the specifications of the Dell Precision™ T5810 and Dell Precision™ 7510.

BUYING YOUR OWN COMPUTER

If you are planning to purchase a different computer than the Dell Precision T5810, or 7510 please contact us for detailed advice.

We recommend that you do not use the following computers, as these have caused our customers problems in recent years:

- All HP (Hewlett Packard) computers
- Dell Optiplex
- Dell Vostro
- Low-end consumer models
- Dell dual core computers

Computer requirements

- Media Recorder supports Microsoft Windows 7 64-bit Professional edition with Service Pack 1 and Windows 10 64-bit Professional edition. A quick test was also carried out with Windows 8.1 64-bit Professional edition.
- For working with Media Recorder and video (files or cameras), we recommend that you use a professional workstation. It is possible to buy consumer-range computers with a high processor speed and plenty of memory, but in order to remain competitive regarding price, the manufacturers often economize on the underlying system architecture. That means those computers are suitable for home use, but not for running professional scientific software. You should select a computer which is intended for professional use or labeled by the manufacturer as a workstation.
- If you use an older desktop computer, it should have at least a 3.5 GHz Quad Core processor and at least 8 GB of memory. A laptop should have at least a 2.8 GHz Quad Core processor and at least 8 GB of memory.
- If you are scoring from video files on the hard disk, you need sufficient free space to store them (MPEG-4 at least 0.5 GB/hr, and H.264 at least 0.6 GB/hr).
- For working with digital video, a good quality high-end video card designed for workstations is recommended.
- We recommend to use a separate 1 Gb network adapter for the IP and GigE cameras and preferably the Intel Pro/1000 CT or PT.

To use the videos in Noldus software

- We strongly recommend to run a test recording of about 2 minutes and play it back in The Observer XT, EthoVision XT or FaceReader, before you start the actual recording. With this test recording you can also determine the delay between the moment you click the start button of Media Recorder and the actual start of recording.
- For The Observer XT you need the Media Module to be able to record and play back up to 2 video files simultaneous. You need the additional Multiple Media Module to play back up to 4 video files simultaneous.

Appendix C

Testing a setup with Media Recorder

If you want to use Media Recorder with an unsupported camera or computer, it is necessary to test the quality of the video. Low quality can be caused by dropping video frames, or the audio and video becoming out of sync, or two or more video cameras becoming out of sync. You can do this as follows:

1. Set a timer display running on a computer monitor (preferably with both digital and analog display) and play music (not on the same computer as Media Recorder). Make sure no background programs are running on the computer.
2. Make a recording in the normal way. Remember to plug in your microphone if you will be using audio.
3. After the normal maximum recording time, give an audio and visual cue (e.g. click your fingers) and stop the recording
4. Check the recording length in MediaInfo and number of frames in GSpot (see **TOOLS FOR TROUBLESHOOTING** on page 71). Use the frame rate to determine if any frames are dropped.
5. Go to the moment where you gave the cue and check if the audio and video are in sync, and if multiple videos are in sync.

Note that a small error is not necessarily a problem (and is normal); it depends entirely on the accuracy with which the audio and video need to be scored.

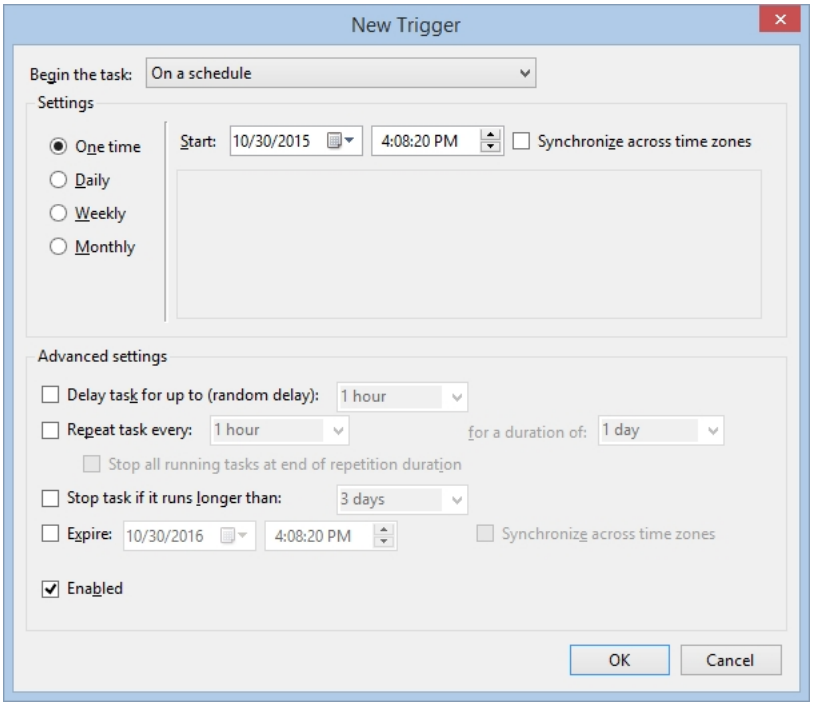
Appendix D

Control Media Recorder at a predefined time

Windows 7 and 10 come with the program **Task Scheduler**. With this program you can control other programs at a predefined time. With the external commands you can control Media Recorder at a predefined time. This is especially useful when you want to start recording in the middle of the night, or you do not want to disturb the test subjects by handling the video software.

The procedure below is an example of the possibilities of Windows Task Scheduler. Since this is a Microsoft program, Noldus IT offers no support for this feature.

1. **Windows 7** - Type **Task Scheduler** in the **Search** field of the Windows **Start** menu. Open the program **Task Scheduler**.
   Windows 10 - Type **Task Scheduler** in the Start window. Then click **Schedule tasks**.
2. Choose **Action** > **Create Task**.
3. In the **General** tab, type a name in the **Name** field, for example Media Recorder with Webcam.
4. Optionally enter other settings in this tab and open the tab **Triggers**.
5. Click the button **New**.
6. Select **On a schedule** from the list next to **Begin the task:**
7. Enter the start time of the command in the **Start** field and choose whether you want to send the command once, daily, weekly or monthly. The window will look like this:



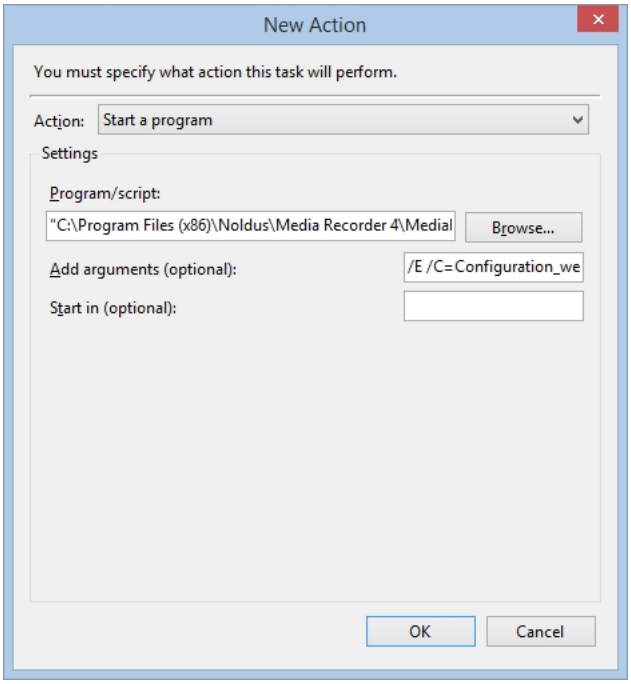
8. Optionally, enter Advanced Settings and click **OK**.
9. Click the **Actions** tab and choose **New**.
10. Choose **Start a program** next to **Action.**
11. Browse to **MRCmd.exe**.

12. Enter the command in the **Add arguments (optional):** field. For example, to start Media Recorder and load the configuration file for your webcam, type:

    /E /C=Configuration_webcam.mrs

    If the configuration file is not located in the folder **C:\Users\Public\Public documents\Noldus\Media Recorder**, you must type the full path. If the file name or path contains spaces you must type it in between quotation marks (See also **Load a configuration file** on page 47).

    Your window will look like this:



13. Optionally select or change any settings on the other tabs.

14. Similarly, you can create tasks to start and stop recording at a predefined time with the commands **/R** and **/S** and to close Media Recorder with the command **/X**. Create a task for each command.

Allow enough time for Media Recorder to open. When a command **Start recording** is sent before Media Recorder program is open, the recording does not start.

By default, the tasks are stored in the folder **Task Scheduler Library**. To edit or delete a task, click this folder in the tree on the left side and select the task in the window Task Scheduler Library. In the **Actions** pane, click **Properties**, or **Delete**.

Appendix E

Install the Picolo U4, or U8, H.264 encoder card

THE STEPS TO INSTALL THE PICOLO H.264 ENCODER CARD

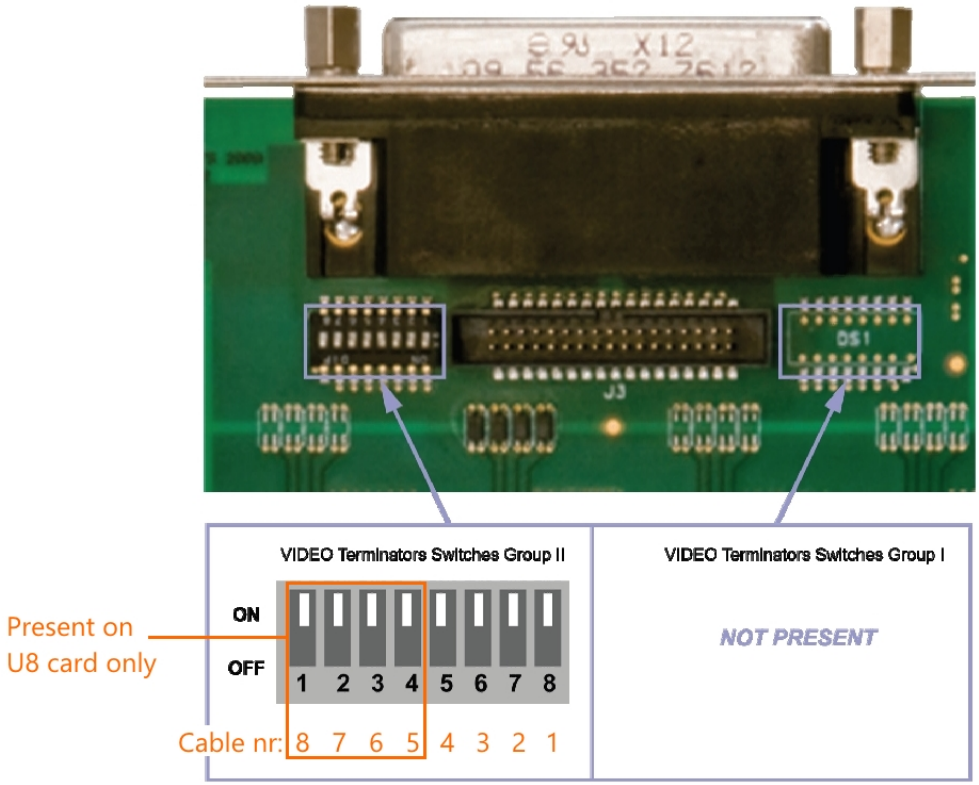
If you ordered a computer and analog cameras from Noldus Information Technology when you purchased Media Recorder, the encoder board is already installed in your computer and its drivers are installed. You can connect your cameras and start recording.

If you bought your computer somewhere else, you must insert the encoder board yourself. This involves the following steps:

- If you track live and save video in EthoVision XT, set the dip switches of the board to the correct position (page 78.
- Install the card in the computer (page 79).
- Install the drivers for the card (page 80.)

SET DIP SWITCHES (ONLY IF YOU TRACK LIVE AND RECORD VIDEO SIMULTANEOUSLY IN MEDIARECORDER)

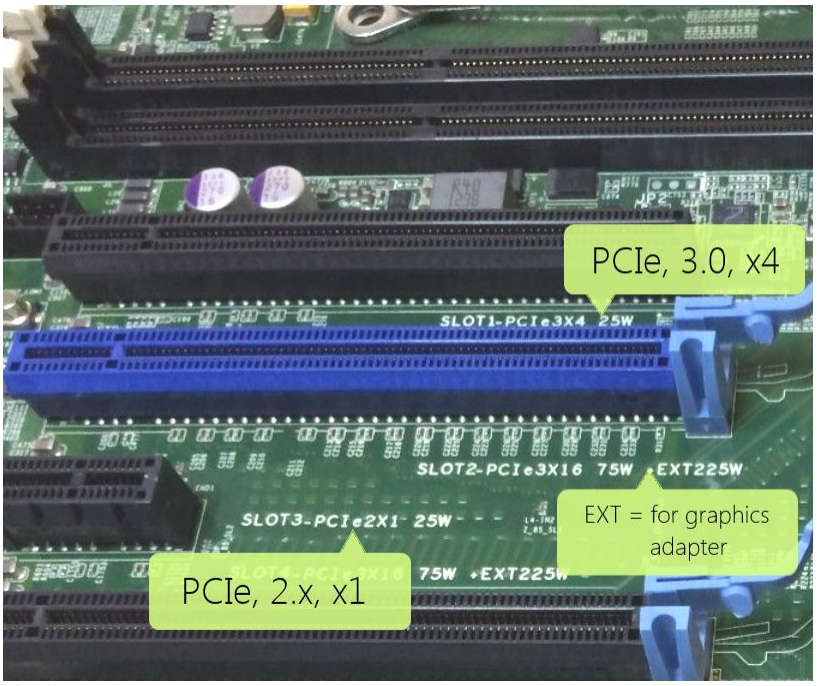
If you track live and record video in Media Recorder simultaneously, you must split the analog video signal and connect it to two channels on the Euresys encoder card. The dip switches must then be set in the correct position. Make sure that for the video channels you use, one dip switch is set to ON and the other to OFF. The picture below shows which switch belongs to which video channel.



INSTALL CARD

The following steps are required to install the Picolo U4, or U8, H.264 encoder card.

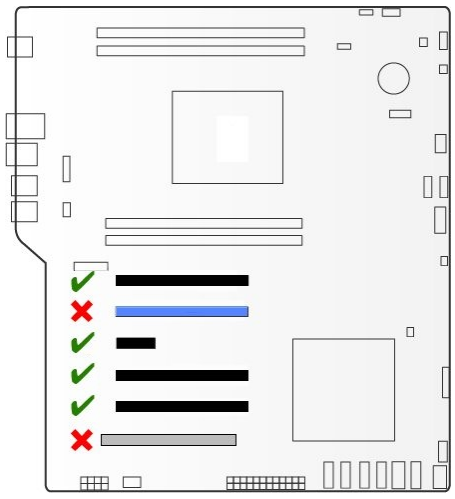
1. Make sure your computer is turned off and the power cable is disconnected. Open the computer.
2. Select a free PCIe expansion slot, and remove the corresponding extension cover.
   Different PCIe slots have different properties, resulting in different performances. When possible, choose the slot that gives maximum performance. To estimate performance, take note of the slot version (2, 3, etc.; see the figure below). Do not use the graphic slots (see also the drawing of the available slots).



Detail of the PCIe slots in a Dell computer.

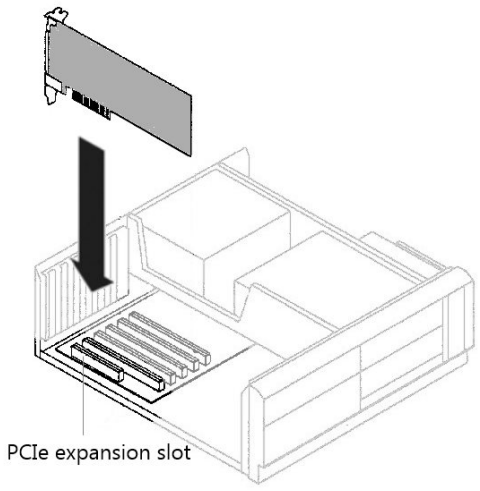
3. Compare this number with the following table:
   - PCIe v1.x: 250 MB/s
   - PCIe v2.x: 500 MB/s
   - PCIe v3.0: ~1 GB/s
   - PCIe v4.0: ~2GB/s

Note that values are given per *lane*; they should not be multiplied by the number of lanes in a slot (e.g. x4) since the card has a 1x connector).



Available PCIe slots in the Dell T5810 computer.

4. Unpack the Euresys Picolo H.264 card, place it into the slot, and press it carefully into position. If the card does not fit into place easily, remove it and repeat the operation.



When touching the board, its electronic components can be damaged by static electricity. To avoid any such risk, make sure that you are grounded. You can ground yourself by putting on an earthing wristlet, and attaching its clip to the metal frame of the computer. If an earthing wristlet is not available, you can hold the metal frame with one hand while holding the ethernet card in your other hand. Ensure also that your clothing does not touch any components while handling the card.

5. Fix the card to the chassis and re-fit the computer's cover.

INSTALL DRIVERS

1. Now install the Euresys card drivers. Insert the Media Recorder installation USB stick in the computer. Browse to the folder **Drivers and Tools\Drivers\Euresys\UxH264** on the Media Recorder installation USB stick. Run the file **picolo-u4-u8-u16-h264-win-2.5.0.139-ds-driver**.
2. When a security warning appears, click Run and follow the instructions on your screen.
3. Click **Close** when the **Operation Successful** window appears. A message appears that your computer needs to be restarted. Click **Yes**.

Appendix F

Set up IP cameras

THE STEPS TO INSTALL IP CAMERAS

If you ordered a computer and IP cameras from Noldus Information Technology when you purchased Media Recorder, the cameras are already installed. Also Media Recorder has been set up to use with these cameras. You can connect your cameras and start recording.

If you bought your computer and cameras somewhere else, you must assign IP addresses to the cameras and create camera and Media Recorder settings yourself following the entire procedure below.

If you bought your cameras from Noldus IT and installed Media Recorder yourself, the cameras are installed but you must set up Media Recorder. Skip the first sections in this appendix and go directly to **SET UP MEDIA RECORDER FOR ONVIF DEVICES** on page 86 or **SET UP MEDIA RECORDER FOR DEVICES THAT DO NOT SUPPORT ONVIF** on page 88. The Axis cameras sold by Noldus IT support ONVIF.

In this appendix you find the instruction for Axis IP cameras. If you have other cameras, consult the camera manual. We recommend to use a dedicated 1 Gb network for the cameras. If you do not use the IP cameras with a dedicated network, consult your system administrator to obtain the correct IP addresses. Setting up IP cameras involves the following steps:

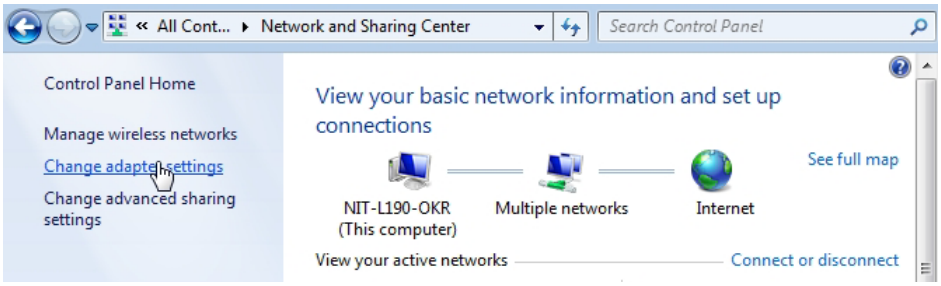
1. **SET COMPUTER IP ADDRESS IN RANGE OF CAMERA** (page 81).
2. **CREATE CAMERA SETTINGS** (page 82).
3. **SET UP MEDIA RECORDER FOR ONVIF DEVICES** (page 86) or **SET UP MEDIA RECORDER FOR DEVICES THAT DO NOT SUPPORT ONVIF** (page 88).

Furthermore this chapter contains the procedure for **PAN, TILT, ZOOM CONTROL** of IP cameras that support ONVIF (page 90).

SET COMPUTER IP ADDRESS IN RANGE OF CAMERA

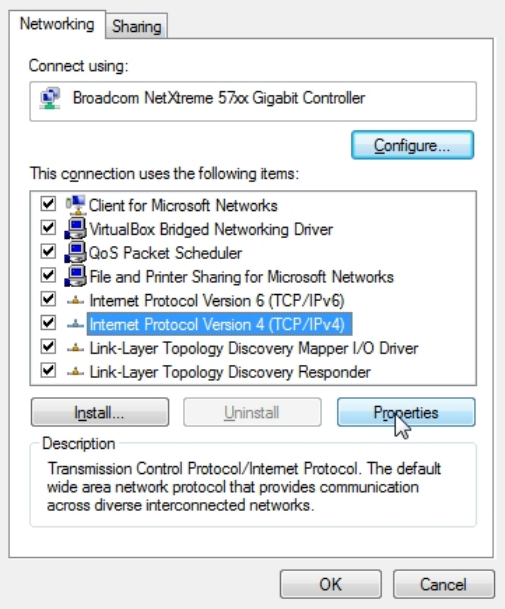
Follow the steps below for to set the IP address of the computer with Media Recorder in the range of the cameras.

1. Open the Control Panel and select **Network and Sharing Center**.
2. Click **Change adapter settings** on the left side of your window.

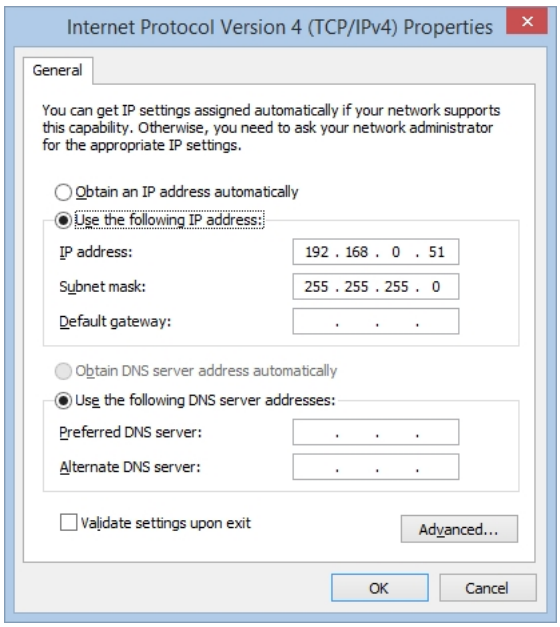


3. Right-click **the Local Area Connection** and click **Properties**. If your computer has more than one Local Area Connection, choose the one with which the computer is connected to the cameras. To check which one this is, remove the cable from this IP port on your computer. The LAN connection that gets a red cross through it is the correct one.

4. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



5. Click **Use the following IP address** and enter the IP address and **Subnet mask** supplied by your system administrator. Leave the other fields empty.



6. Click **OK** and close the Control Panel.

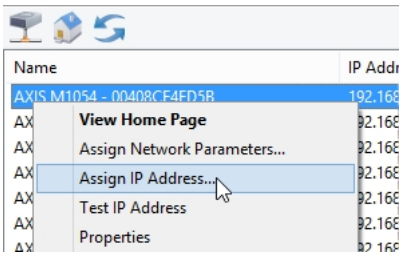
CREATE CAMERA SETTINGS

1. If you did not give your computers a fixed IP address yet, do so now. See **SET COMPUTER IP ADDRESS IN RANGE OF CAMERA** on page 81 for the procedure. Then go to step 2.
2. Connect all cameras.

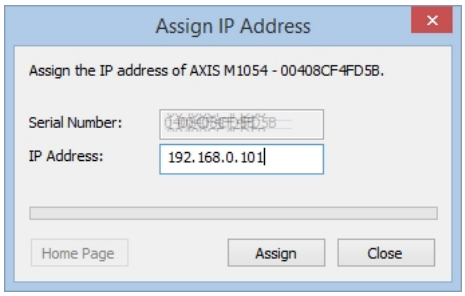
Set camera IP address

3. Insert the installation USB stick into your computer and copy the file **IPUtility.exe** from the folder **Software\Axis Tools** to your computer. Do not copy it to your desktop, the tool will then not work correctly.

4. Run **IPUtility.exe**. A window opens in which all the connected devices are listed.
5. Right-click the device and select **Assign IP address**.



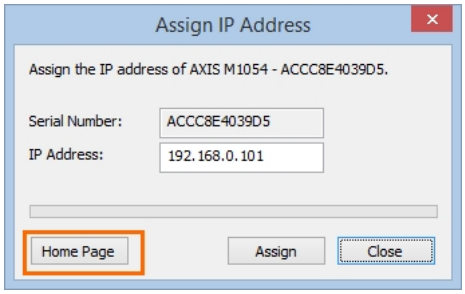
6. Enter the IP address and choose **Assign**.



7. According to the message that appears, disconnect and reconnect the camera and click **Assign**. Wait until the IP address is set.
8. Right-click the camera and select **Test IP address**. When the details were entered correctly a message appears that the camera is accessible.
9. Repeat steps 5 to 8 for all cameras. Make sure you use different IP addresses for all cameras and computer and other network devices in the network.

Set password

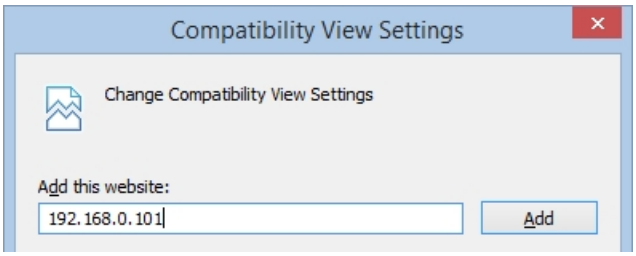
1. In the IPUtility tool, click the Home Page button. the camera now opens in a browser.



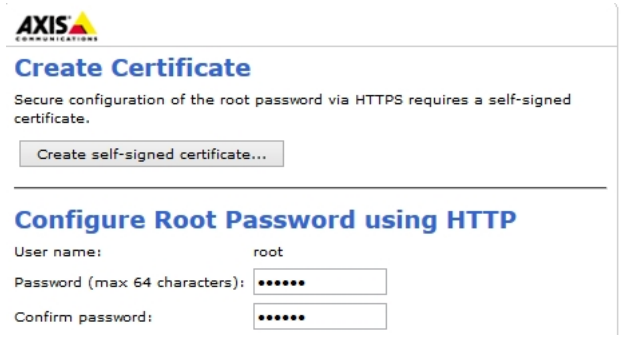
You can also access this page by typing the IP addess in the address field of, for example, Internet Explorer.

Close the browser before you start recording. Leaving it open may cause recording problems in Media Recorder.

If you do not get a view in Internet Explorer, click the Settings wheel in the upper-right corner of your window and choose **Compatibility View Settings**. Enter the IP address of your camera and click **Add**. Other browsers may have a comparable setting.



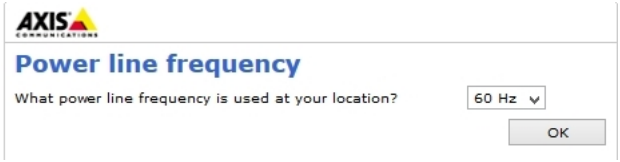
2. The first time you open the camera in a browser, you must set a password. If you obtained cameras from Noldus IT, this password is *Noldus*. The user name *root* cannot be changed. Do not use the characters @, space, or colon (:) for the password. These characters cannot be used in Media Recorder.



3. As soon as you set the password, you must log in to the camera with the password you just set.

Select power line frequency

The first time you log in in the camera, you must select a power line frequency. Look up the correct power line frequency of your country on Internet.



Access camera settings

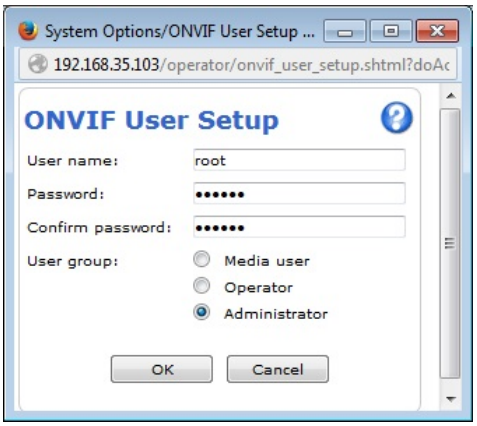
1. Open the camera in a browser by clicking the **Home page** button in the IPUtility tool (see step 1 on page 83) or typing the IP address in the address field of an internet browser. Then enter the password.
2. Click **Setup** at the top-right corner of your screen**.**

Create ONVIF User name and Password

To use the pan, tilt, and zoom options in **Media Recorder**, you must create an ONVIF user in the camera. This option is, of course, only possible if your camera supports ONVIF. If the camera does not support ONVIF, pan, tilt, and zoom must be done with a browser. Always close the browser before you start recording with Media Recorder.

The procedure to create an ONVIF user in Axis cameras is described below. For other camera brands, consult the camera manual.

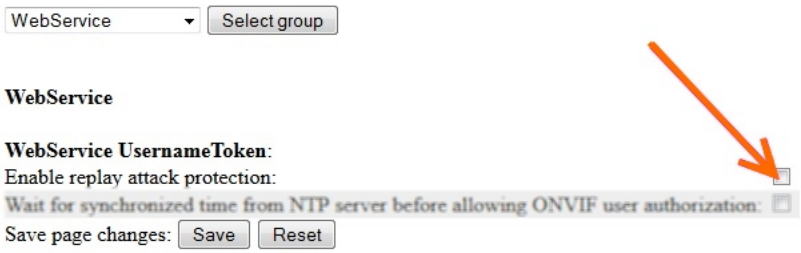
1. Open the camera settings (see **Access camera settings** on page 84).
2. Click **System Options** and then **ONVIF**.
3. Click **Add** and enter a **User name** and **Password**. Do not use the characters @, space, or colon (:) for the user name or password. These characters cannot be used in Media Recorder. If you obtained the camera from Noldus IT, the **ONVIF user name** is *root* and the **ONVIF password** is *Noldus*.
4. Select **Administrator** as **User Group** and click **OK**.



Disable replay attack protection

Also Prevent that connection to the camera fails if the time of the **Media Recorder** computer differs from the time in the camera. For an Axis camera, the procedure is described below. Other camera brands may have a comparable setting. Consult the camera manual for the procedure.

1. Open the camera settings (see **Access camera settings** on page 84).
2. Under **System Options**, select **Advanced**.
3. Click **Plain Config**.
4. From the list at the bottom, select **WebService** and click **Select Group**.
5. Under **WebService UsernameToken**:, make sure the checkbox **Enable replay attack protection**: is not selected.



Replay attack protection is necessary for security cameras, but not for IP cameras in a dedicated network. If you do not want to disable this option, make sure that the clock times of the computer and camera are exactly the same.

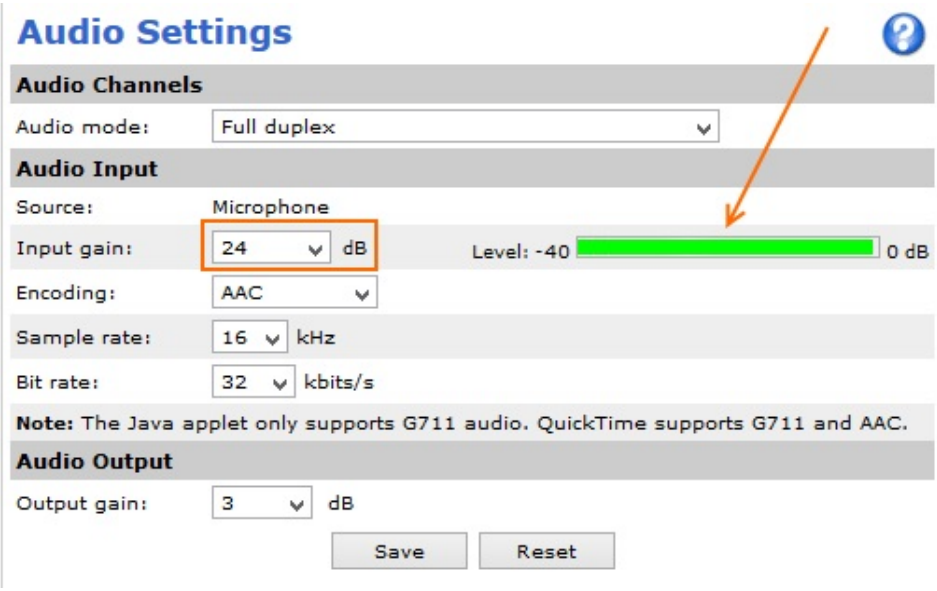
IR cut filter

1. Open the camera settings (see **Access camera settings** on page 84).
1. Click **Video & Audio** and then **Camera Settings**.
2. Check if there is an option **IR cut filter**. If so, set it to **On**. This avoids that the cameras switches to black and white at low light levels.
3. Click **Save**.

Audio settings

To adjust the recording volume:

1. Open the camera settings (see **Access camera settings** on page 84).
2. Choose **Video & Audio** > **Audio Settings**.
3. In the **Input Gain** list, by default the value **Auto** is selected, which means that audio level is automatically adjusted by the camera software. To change the audio recording volume, select another value from the **Input Gain** list. Check that the green field in the **Level** field covers the entire range with normal speech in the location.



What next?

1. Create all camera settings from **CREATE CAMERA SETTINGS** on page 82 onwards for each camera.
2. Close the browser and the IPUtility tool.
3. Continue with setting up Media Recorder. See either **SET UP MEDIA RECORDER FOR ONVIF DEVICES** (page 86) or **SET UP MEDIA RECORDER FOR DEVICES THAT DO NOT SUPPORT ONVIF** (page 88).

SET UP MEDIA RECORDER FOR ONVIF DEVICES

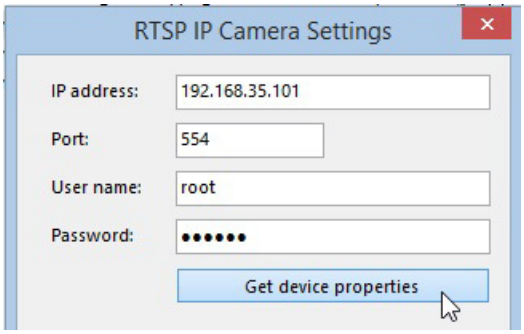
If your device does not support ONVIF, continue with **SET UP MEDIA RECORDER FOR DEVICES THAT DO NOT SUPPORT ONVIF** on page 88.

1. Open Media Recorder and choose **File > Video Settings** or click **Settings**.

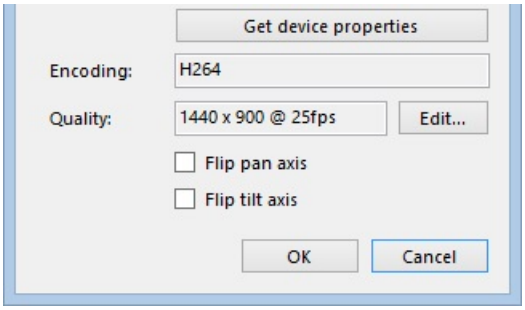
2. Select the checkbox in front of the video channel and choose **RTSP IP Camera (Noldus RTSP Source Filter)**.

3. Click the **Advanced Video Settings** button.
4. Enter the **IP address**, **ONVIF User name** and **ONVIF Password** for your camera. If you obtained cameras from Noldus IT, the **ONVIF user name** is *root* and the **ONVIF password** is *Noldus*.
   If you bought cameras yourself, **Create ONVIF User name and Password** on page 84 for the procedure to create an ONVIF user name and ONVIF password.
   If the default **Port** *554* is already in use, ask your system administrator for help to select another one.

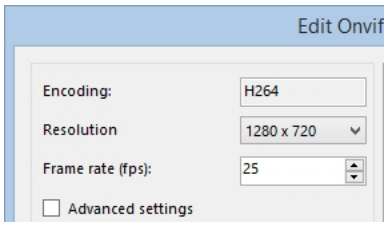
5. Click **Get device properties**.



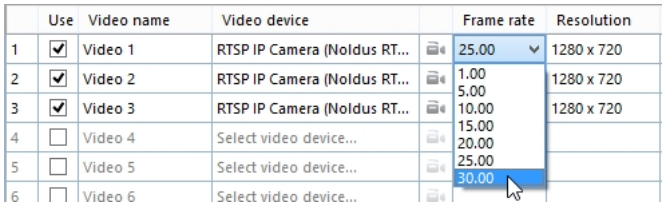
6. The **Encoding** and **Quality** fields appears with the default video format, frame rate and resolution of the camera.



7. Optionally, click **Edit** and select another frame rate or resolution. Click **Update** when done. It is possible to change video quality with Advanced settings, but recommend to only do this when problems with video quality or data transfer over the network occur. See **Advanced video quality options** on page 88 for an explanation of the options.



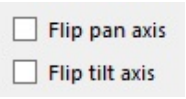
It is also possible to change the frame rate and resolution in the table with selected video devices.



In previous versions of Media Recorder, the tool OnvifProfileManager was used to change the frame rate and resolution of the camera. This is no longer necessary. We recommend not to use this tool anymore. Change the frame rate and resolution in the table with selected video devices (see picture above).

---

8. You may want to reverse the direction the camera moves with Pan and Tilt). To do so, select the checkbox **Flip pan axis** (horizontal movement) or **Flip tilt axis** (vertical movement) or both.

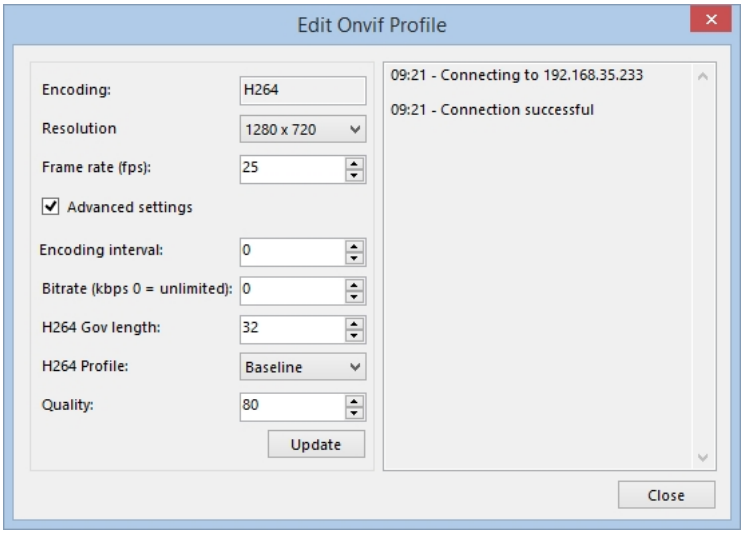


9. Click **OK.**

10. To select the microphone from the camera, or a microphone connected to it, select **RTSP IP camera (Noldus RTSP Source Filter)** from the **Audio device** list. See **Audio settings** on page 86 how to adjust the recording volume.

11. Continue with **SELECT A VIDEO DEVICE** on page 41.

Advanced video quality options



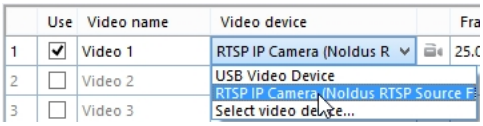
If an option cannot be edited, your camera does not support other options, or the value is set by the chosen profile.

- **Encoding interval** - This value cannot be edited and is set by the profile.
- **Bitrate** - With this option you can set a limit to the data transfer. The default value 0 means unlimited. If you enter a value, data transfer is limited to this value in Kb per second.
- **H264 Gov length** -The interval in which the I-Frames (uncompressed images) will be coded in the video file. A value of 1 means that every frame is an I-frame. A value of 2 means that every second frame is an I-frame. Decreasing the number increases the video quality, but also the data transfer. See https://en.wikipedia.org/wiki/Video_compression_picture_types for a description of the frame types.
- **H264 Profile** - The encoding profile from the IP camera. Media Recorder uses the **Baseline** profile and this option cannot be edited.
- **Quality** - The quality of the encoded video file. Higher number gives higher encoding quality, but also more data transfer over the network.

SET UP MEDIA RECORDER FOR DEVICES THAT DO NOT SUPPORT ONVIF

1. Open Media Recorder and choose **File > Settings** or click **Settings**.

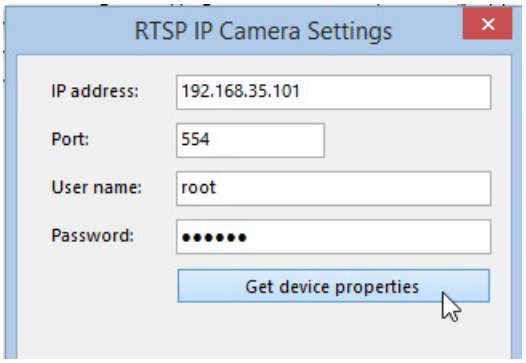
2. Select the checkbox in front of the video channel and choose **RTSP IP Camera (Noldus RTSP Source Filter)**.



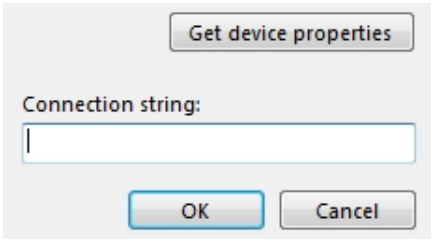
3. Click the **Advanced Video Settings** button.

4. Enter the **IP address** and enter the **User name** and **Password** of the device. If you bought your cameras from Noldus IT, the **User name** is *root* and the **Password** is *Noldus*.
If the default **Port** *554* is already in use, ask your system administrator for help to select another one.

5. Click **Get device properties.**



6. The field **Connection string** appears.



7. Look up in the manual of your device where the video files can be accessed via the RTSP communication protocol. Enter the path from the slash after the connection information in the **Connection string** field. For example, */stream.sdp* for an Epiphan VGADVI broadcaster (Note that this device is not yet supported with Media Recorder).

8. Click **OK** and, optionally, select another frame rate or resolution. However, make sure you select the same frame rate as is selected in the device itself when you opened the camera in a browser.

9. Optionally, open the camera in a browser to pan, tilt, or zoom (see **Access camera settings** on page 84). Make sure you close the browser before starting recording with Media Recorder.

10. Click **OK** and continue with **SELECT A VIDEO DEVICE** on page 41.

PAN, TILT, ZOOM CONTROL

Pan, tilt and zoom is possible with IP cameras that support ONVIF. If you use the CH products RS Desktop joystick for PTZ control, make sure it is connected before you start Media Recorder.

If you hover with your mouse over the camera image, two buttons appear in the top-right corner of your window.

Enable or disable PTZ control

Opens the PTZ preset menu

PTZ control in Axis M1054, Axis P5515, and Axis P5534

1. Click the **Enable PTZ** button in the image you want to adjust. A four-arrow cross appears in the middle of the image and your mouse pointer becomes a small point. Click the camera image and keep your left mouse button pressed to control the camera. The cross now becomes connected to the point and the camera image moves in the direction of the point. The further away from the center cross you click, the faster the camera moves.

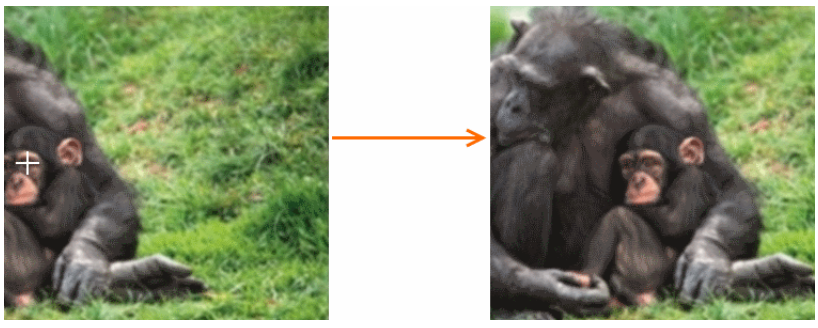
To reverse the camera pan or tilt direction, open the **Advanced Video Settings** window and select the checkbox **Flip Pan axis** or **Flip Tilt axis** (see step **8** in the section **SET UP MEDIA RECORDER FOR ONVIF DEVICES** on page 86).

2. Zoom in and out with your mouse wheel.

PTZ control in Axis M5014

To use PTZ control with an Axis M5014, the file **Default Settings.mrs** must be edited. When you ordered a complete solution from Noldus IT, this has already been done for you. To use PTZ control:

1. Click the **Enable PTZ** button in the image you want to adjust.
2. A white cross appears. The camera moves to the point that you click with your mouse.
3. Zoom in and out with your mouse wheel.



When you ordered an Axis M5014 yourself, follow the procedure below to enter the correct settings in the file **Default Settings.mrs**:

1. Open Media Recorder and select your IP cameras (see **SET UP MEDIA RECORDER FOR ONVIF DEVICES** on page 86).
2. Close Media Recorder.
3. Create a backup of the file **Default Settings.mrs** that is present in the folder **C:\Users\Public\Public Documents\Noldus\Media Recorder.**
4. Open the file **Current Settings.mrs** from the same folder with Notepad.
5. Locate the line **<PtzType>1</PtzType>** and change **1** to **0**. There is a line for each PTZ camera that you selected in Media Recorder. Change the line for each Axis M5014 camera.
6. Save the file as **Default Settings.mrs**. These settings are used when the file Current Settings.mrs is not found.
7. Delete the file **Current Settings.mrs** from the folder **C:\Users\Public\Public Documents\Noldus\Media Recorder.**
8. Re-open Media Recorder. Media Recorder opens with configuration file **Default Settings.mrs** and creates a new file **Current Settings.mrs** with the edited settings**.** The new PTZ method is now available.

When you selected the same camera multiple times in Media Recorder, use the same method for pan and tilt in each camera. So for each camera, use either 1 or 0 in each **Default Settings.mrs** file.

PTZ presets

If you are satisfied with the position of your camera, you can save this as a **PTZ preset**. Click the button that opens the **PTZ** menu (see above). The following buttons now appear.

	Save as first PTZ preset
	Save as second PTZ preset
	Return to first PTZ preset
	Return to second PTZ preset

The **Save as** buttons appear when you hover over the **Return to PTZ preset** buttons.

PTZ keyboard shortcuts

The following keyboard shortcuts can be used to control PTZ:

Shortcut key	**Camera action**
Ctrl + 1	Enable / disable PTZ in first video
Ctrl + 2	Enable / disable PTZ in second video
Ctrl + 3	Enable / disable PTZ in third video
Ctrl + 4	Enable / disable PTZ in fourth video
Numpad 1	Move camera left-down
Numpad 2	Move camera down
Numpad 3	Move camera right-down
Shortcut key	**Camera action**
Numpad 4	Move camera left
Numpad 6	Move camera right

Shortcut key	Camera action
Numpad 7	Move camera left-up
Numpad 8	Move camera up
Numpad 9	Move camera right-up
Numpad +	Zoom in
Numpad -	Zoom out

Appendix G

Set up GigE cameras

THE STEPS TO INSTALL GIGE CAMERAS

Together with the Basler GigE camera, you need an Intel PRO/1000 Ethernet card installed in your computer.

IMPORTANT Please note that if you use multiple GigE cameras, each camera should be connected to its own 1Gb Ethernet card.

If you ordered a computer from Noldus Information Technology when you purchased Media Recorder and the Basler GigE camera, the card has already been installed and tested. Also the settings for the computer and camera were made. In this case, you can connect your camera and start recording.

If you bought your computer and camera somewhere else, you need to follow the entire procedure in this appendix to install the Ethernet card, make computer settings, and set up the camera. This involves the following steps:

- **INSTALL THE ETHERNET CARD** (page 93).
- **INSTALL MEDIA RECORDER WITH THE CAMERA DRIVERS** (page 95).
- **SET ETHERNET CARD IP ADDRESS** (page 95).
- **DISABLE WINDOWS FIREWALL FOR THE ETHERNET CARD** (page 97).
- **SET CAMERA IP ADDRESS** (page 98).
- **WHAT'S NEXT?** (page 105).

INSTALL THE ETHERNET CARD

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The ethernet card

1. Turn off your computer and all connected peripherals, such as the monitor and printer. Make sure that the computer is unplugged.
2. Remove the PC's case according to the instructions provided in the PC's user manual.
3. Select a free PCIe expansion slot, and remove the corresponding extension cover.
   Different PCIe slots have different properties, resulting in different performances. When possible, choose the slot that gives maximum performance. To estimate performance, take note of the slot version (2, 3, etc.; see the figure below). Do not use a graphics slot (see also the drawing of the available slots).

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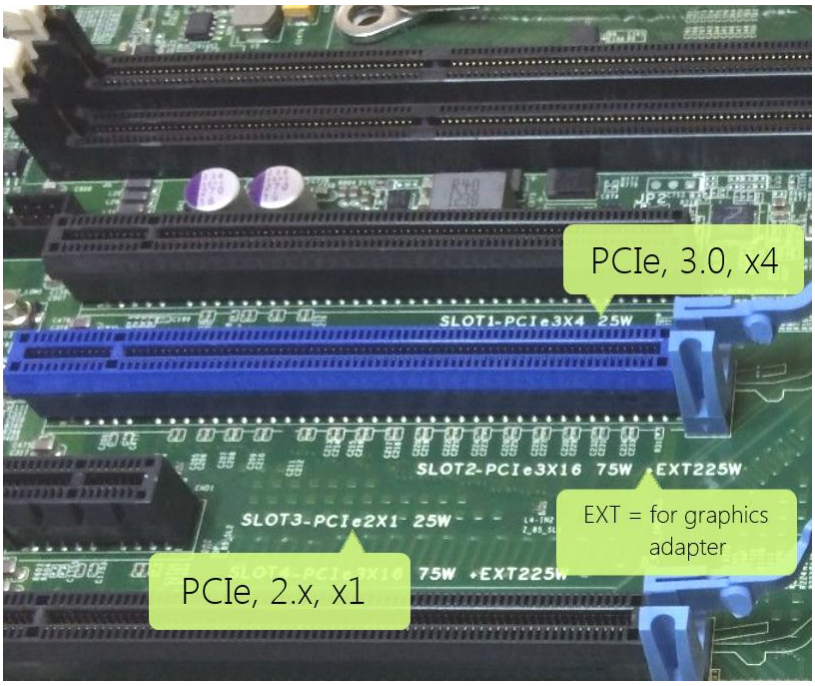
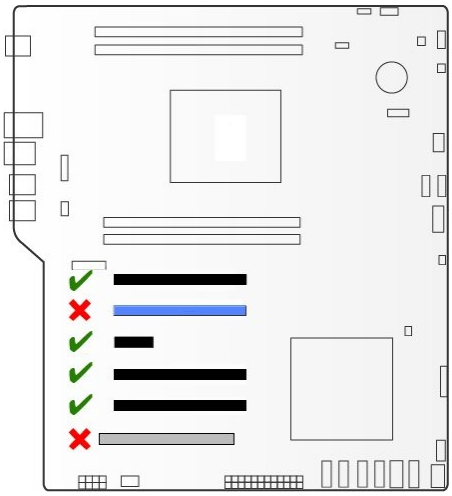


Detail of the PCIe slots in a Dell computer.

4. Compare this number with the following table:

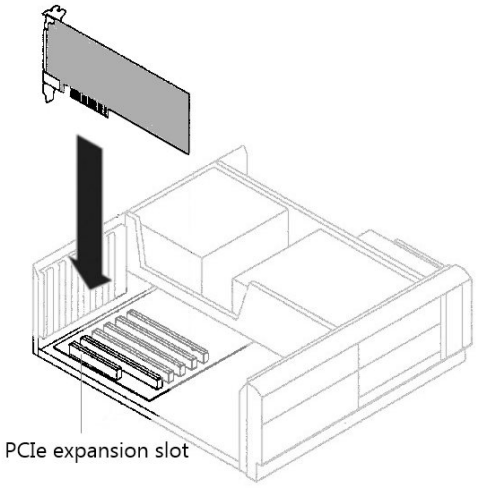
- PCIe v1.x: 250 MB/s
- PCIe v2.x: 500 MB/s
- PCIe v3.0: ~1 GB/s
- PCIe v4.0: ~2GB/s

Note that values are given per *lane*; they should not be multiplied by the number of lanes in a slot (e.g. x4) since the card has a 1x connector).



Available PCIe slots in the Dell T5810 computer.

5. Unpack the Ethernet card, place it into the slot, and press it carefully into position. If the card does not fit into place easily, remove it and repeat the operation.



When touching the board, its electronic components can be damaged by static electricity. To avoid any such risk, make sure that you are grounded. You can ground yourself by putting on an earthing wristlet, and attaching its clip to the metal frame of the computer. If an earthing wristlet is not available, you can hold the metal frame with one hand while holding the ethernet card in your other hand. Ensure also that your clothing does not touch any components while handling the card.

6. Fix the card to the chassis and re-fit the computer's cover.

INSTALL MEDIA RECORDER WITH THE CAMERA DRIVERS

If you upgraded from a previous Media Recorder version and have old drivers for the camera installed, uninstall them first. To do so, open the Control Panel and choose **Program and Features**. Select the Basler camera driver and choose **Uninstall**.

Install the camera drivers from the installation USB stick. In the setup window, choose **Basler Camera driver** in the **Drivers and tools** field. This is the same driver as for the Basler USB camera. Follow the procedure in **Install Media Recorder and device drivers** on page 20.

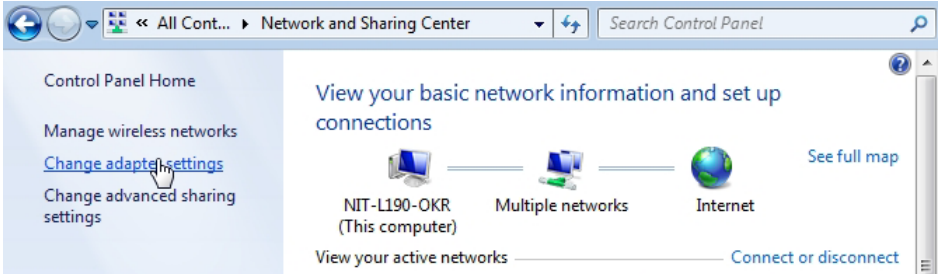
If you already installed Media Recorder, insert the installation USB stick into the computer. Browse to **Drivers\Basler\5.0.5.8999** and run the file **Basler_pylon_5.0.5.8999.exe**. Follow the instructions on your screen to install the driver.

During installation you are asked to choose the user profile. Select **Camera user**. Also, you must select the camera type. Select **GigE**.

SET ETHERNET CARD IP ADDRESS

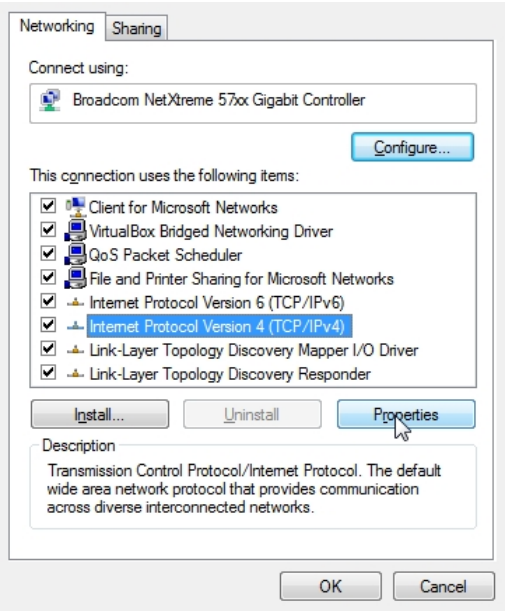
1. Connect the camera with the ethernet cable to a Power Over Internet (POE) Switch and connect the POE Switch to the port of the Intel PRO/1000 ethernet card.
2. Open the Control Panel.
3. Go to **Network & Internet** and then **Network and Sharing Center**.

4. Click **Change adapter settings** on the left side of your window.

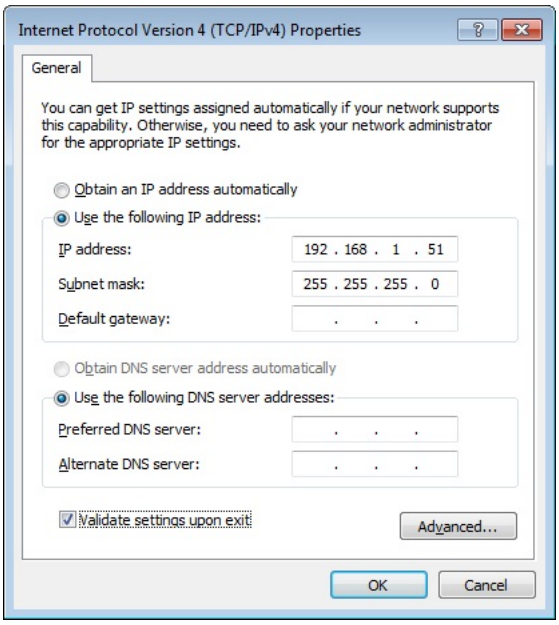


5. Right-click **the Local Area Connection** and click **Properties**. If your computer has more than one Local Area Connection, choose **Basler GigE Vision Adapter**. Write down the number of this connection.

6. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



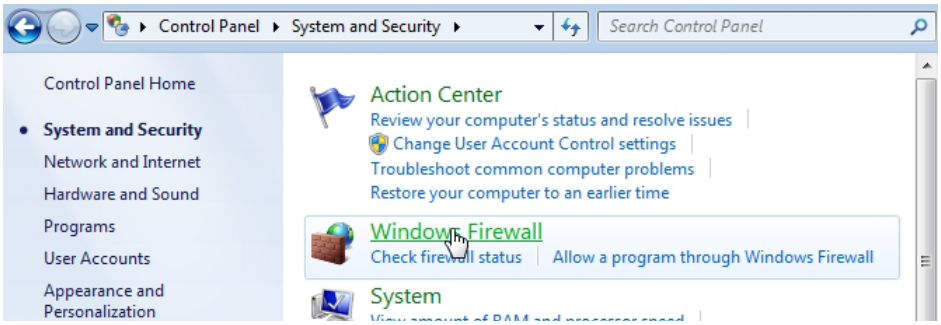
7. Select the radio buttons **Use the following IP address** and **Use the following DNS server addresses** and fill in the details as shown in the figure below. Also select the checkbox **Validate settings upon exit**. When done, click **OK** and then **Close**.



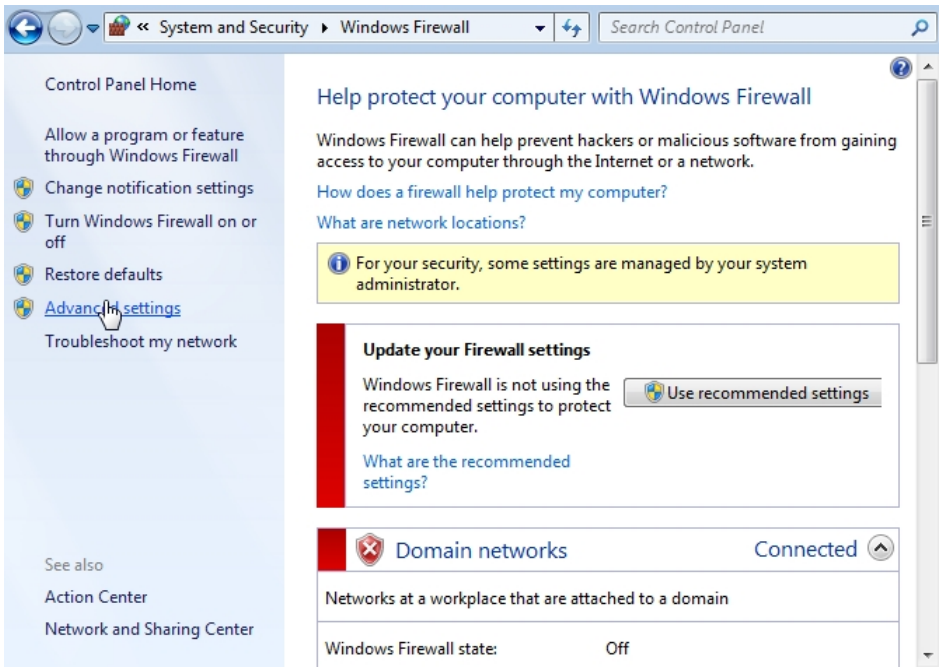
8. A **Windows Network Diagnostics** window appears. Click **Close** when it is finished. Then close all windows.

DISABLE WINDOWS FIREWALL FOR THE ETHERNET CARD

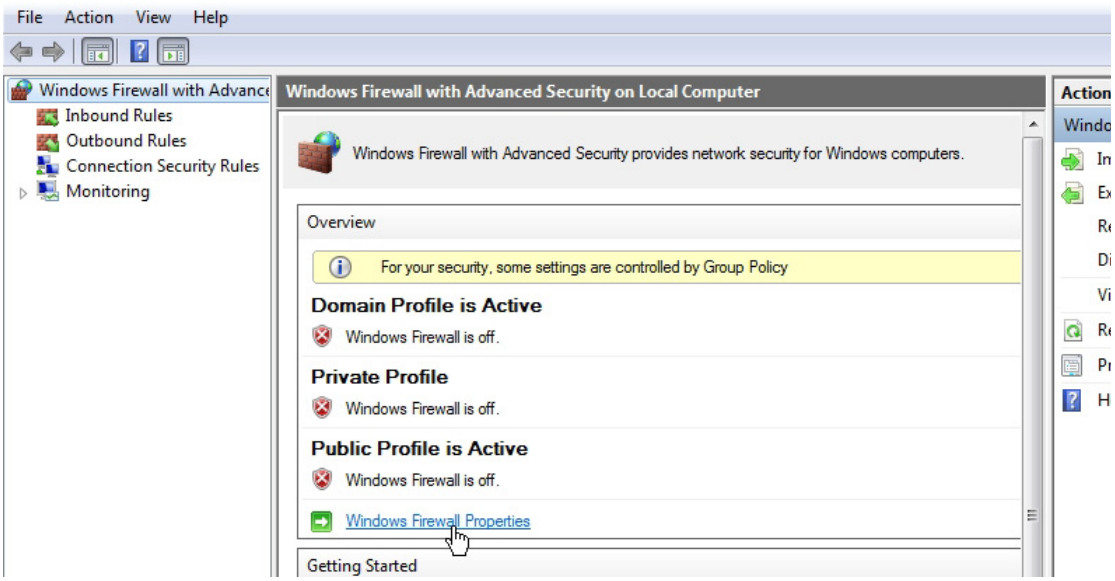
1. Open the Control Panel and go to **System and Security**.
2. Click **Windows Firewall**.



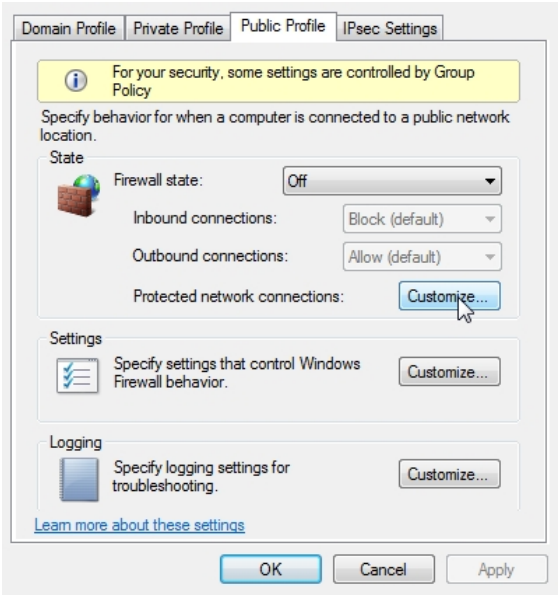
3. Click **Advanced Settings** on the left side of your window.



4. Under **Overview**, click **Windows Firewall Properties**.



5. Open the tab **Public Profile**.
6. Click **Customize** next to **Protected Network Connections**.



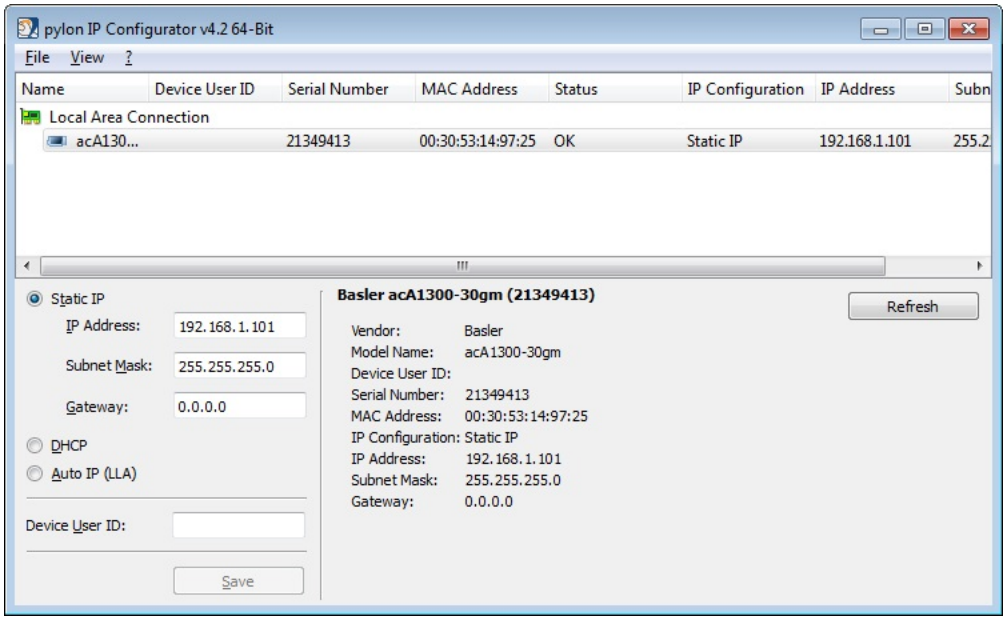
7. Deselect the checkbox in front of **Local Area Connection**. If there is more than one local area connection, check step **5** in the topic **SET ETHERNET CARD IP ADDRESS** on page 95 for the correct local area connection.
8. Repeat the steps **5** and **6** for the **Domain Profile** and **Private Profile** tabs.
9. Click **Close**.
10. A warning balloon appears in the bottom-right of your window. Wait untill this message has disappeared.
11. Close all windows.

SET CAMERA IP ADDRESS

1. Open **Pylon IP Configurator (x64)**. Ignore the warning that the device is unreachable.

2. Select the camera under **Local Area Connection**.

3. Fill in the details in the **IP Address** and **Subnet Mask** fields under **Static IP Address** as shown in the figure below. Make sure the last number differs from the last number of the Ethernet card (see **SET ETHERNET CARD IP ADDRESS** on page 95). If you have multiple cameras, make sure the last numbers differ from each other as well. As an example, give the Ethernet card the number 192.168.1.51 and the cameras the numbers 192.168.1.101; 192.168.1.102 etc.

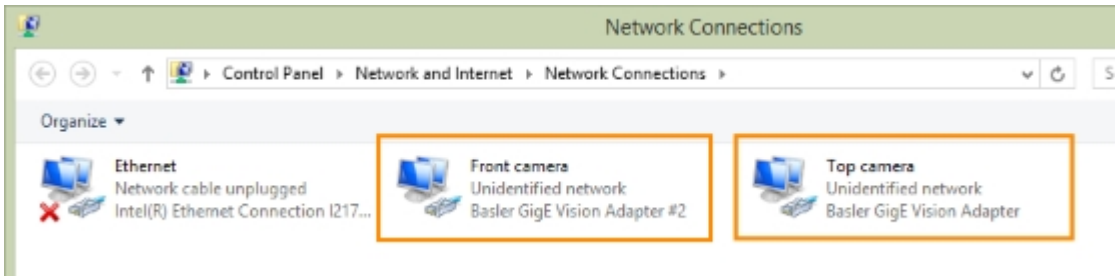


4. Click **Save** and then **Close**.

GIGE CAMERAS; IMPORTANT NOTES

- Each camera should be connected to a separate 1Gb Network adapter, through its own PoE-injector. See install the ethernet card for details.
- Each camera must always be connected to the same adapter, because the IP address of the camera and that of the adapter are linked, and this information is stored in the driver software of each camera. If you swap cameras, they will not be recognized. Therefore, label the adapters and cameras.

  TIP rename the adapters in the Control Panel, for example Front camera and Top camera.

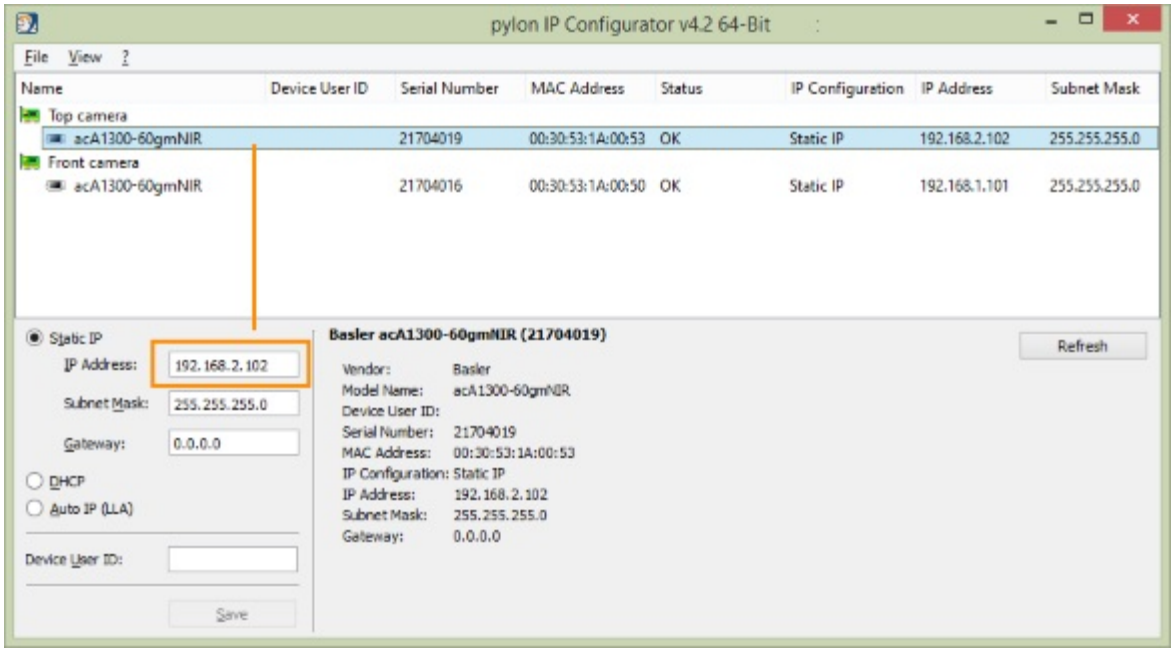


- Each camera must have a unique IP address. The third set of numbers should be different between cameras. However, note that the third set of numbers must be the same for the camera and its own adapter. See below for an example.

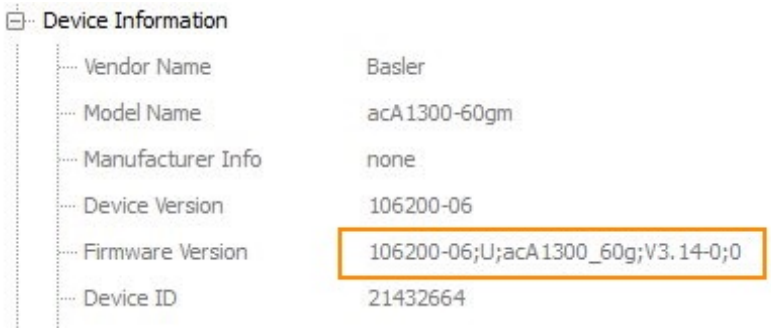
  Camera 1: 192.168.1.101 associated with network adapter with IP 192.168.1.51

  Camera 2: 192.168.2.102 associated with network adapter with IP 192.168.2.52.

  In Pylon IP configurator, the first camera looks like this.



- The cameras should have the same Firmware version. Check this in the Pylon viewer. To do so: In the Features panel, under **Device Information**, check **Firmware Version**. If the two (or more) cameras do not have the same firmware, an upgrade/downgrade must be done.



- Noldus does not support recording from a GigE camera connected to a laptop computer.

CONFIGURE THE CAMERA (GIGE AND USB 3.0)

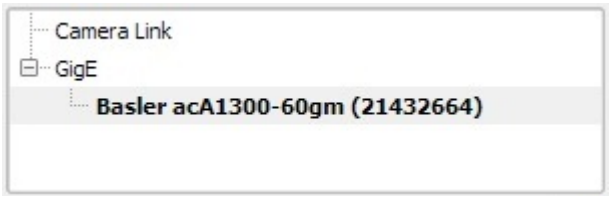
To access the camera settings (general)

1. Make sure Media Recorder (and EthoVision XT, when present on the computer) are not running.

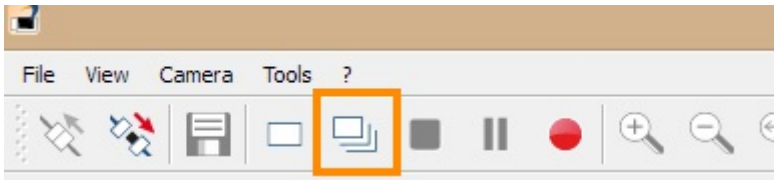
2. Start the **Basler Pylon Viewer** software that comes with the Basler camera.

NOTE The Basler Pylon Viewer software is installed automatically when you install the camera drivers.

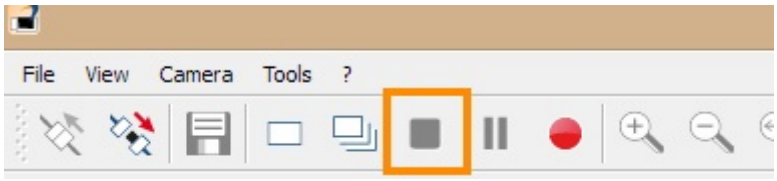
3. Choose **Tools** > **Options** and check that the **User level** is set to Expert or Guru.
4. In the **Devices** panel, under **GigE**, double-click the Basler camera.



5. To preview the camera image, click the **Continuous Shot** button on the toolbar.



NOTE To be able to adjust the settings, click the **Stop** button first.



6. Follow the instructions below that apply.

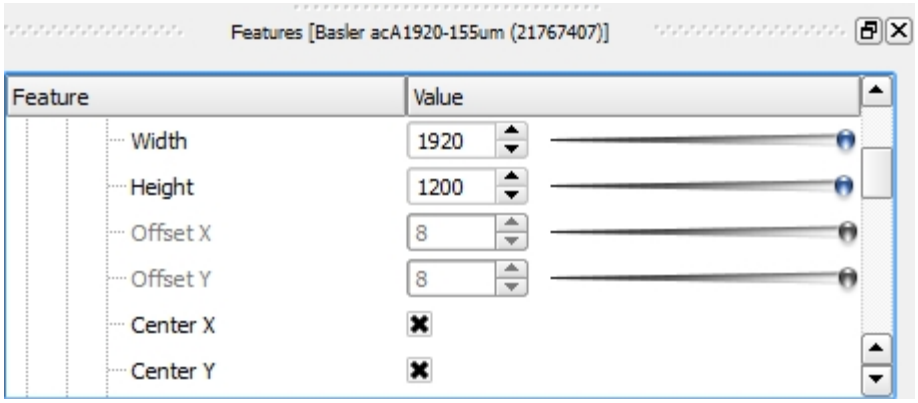
To center the camera view

With this procedure you make sure the camera view is centered.

IMPORTANT If you center the camera view in Media Recorder, the settings are not stored in the camera drivers. Here in Pylon viewer you make sure that the settings are stored in the drivers, also for future recordings.

1. In the **Features** panel, open the Basler camera item and then the **Image Format Control** item.

2. Select both options **Center X** and **Center Y**.



3. Save the settings. See **To save the camera settings** on page 105.

To adjust the camera exposure time

The exposure time (or shutter time) is the time the camera shutter is kept open to let light in. The exposure time limits the maximum achievable frame rate. If sum of the exposure time and the time needed for reading the chip (readout time) is greater than the time between consecutive video frames, the next frame may be dropped, resulting in a lower frame rate, and incorrect time in the video file.

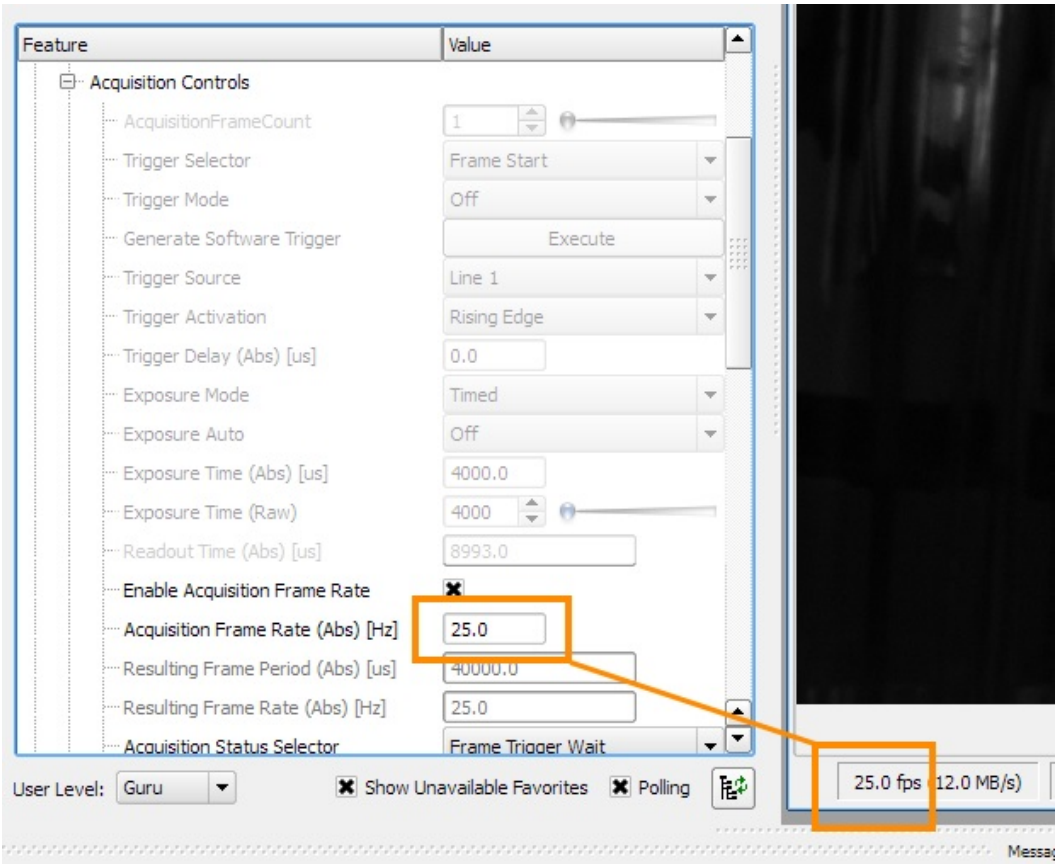
To adjust camera exposure that matches a frame rate:

1. In the **Features** panel, open the Basler camera item and then double-click **Acquisition Control**.
2. Make sure that **Exposure mode** is **Timed**, and **Exposure Auto** is **Off**.

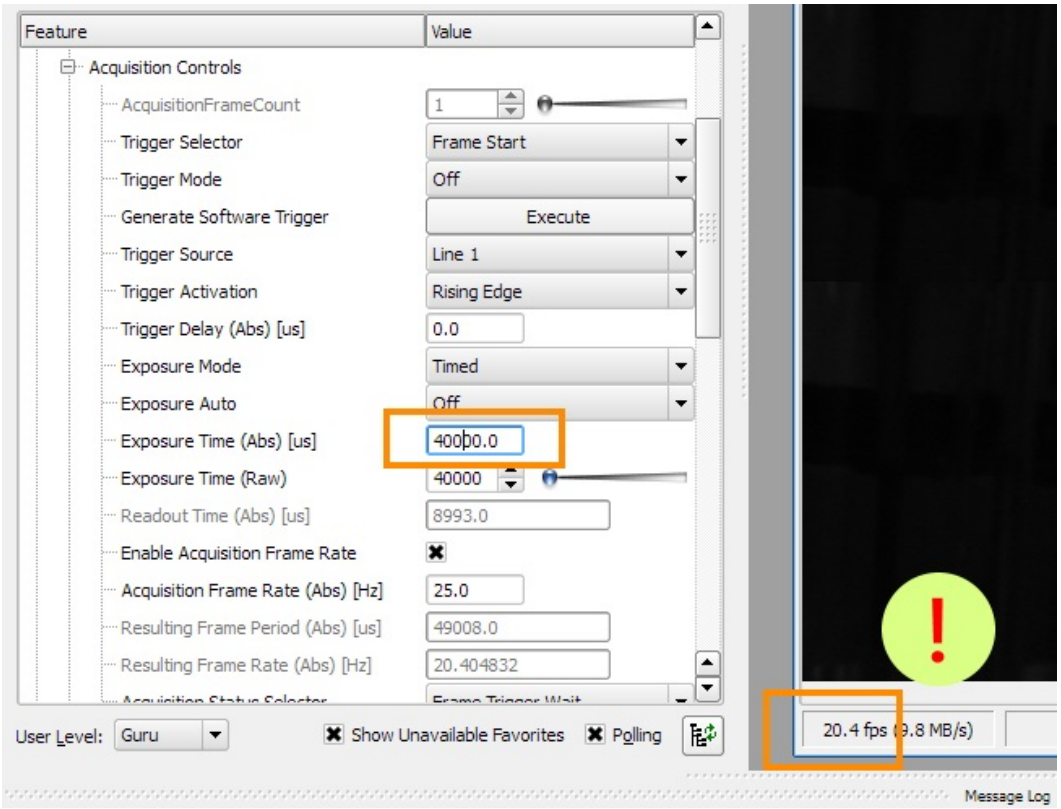
   Next to **Exposure Time (Abs) [us]**, enter the exposure time you require, in microseconds. Fast moving animals like zebrafish larvae, require short exposure times, 4000 or 2000. In all other cases, you may choose a higher value below 20000.

   Press Tab or click another field to confirm.
3. To check that the exposure time is compatible with your frame rate, click the **Continuous Shot** button on the toolbar.

4. At the bottom of the live video window, locate the frame rate resulting with the new exposure time. This should be the same as the one next to **Acquisition Frame Rate (Abs) [Hz]**.



If the resulting frame rate is lower than **Acquisition Frame Rate (Abs) [Hz]**, then either lower the exposure time (this will make the video image darker; open the lens diaphragm to compensate for this), or lower the video resolution. Do this until you see the expected frame rate.

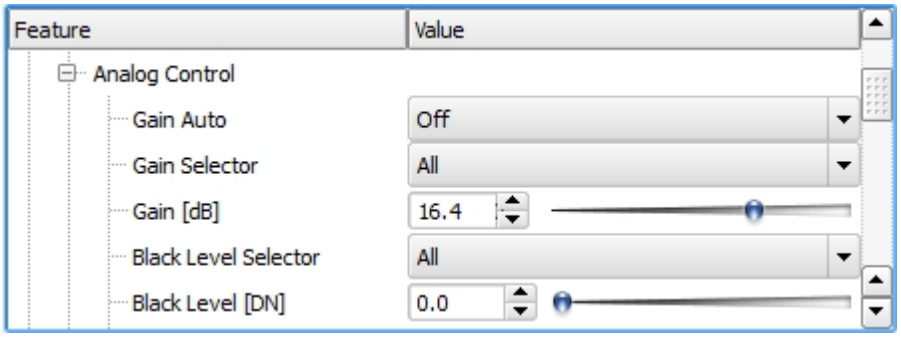


5. Save the settings. See **To save the camera settings** on page 105.

To adjust the camera gain

This applies to both color and black/white Basler cameras.

1. In the **Features** panel, click **Analog Control**.
2. From the **Gain Auto** list, select **Off**.
3. Next to **Gain (dB)**, select the value you require. A higher Gain results in a brighter image, but also more noise and a grainy image.

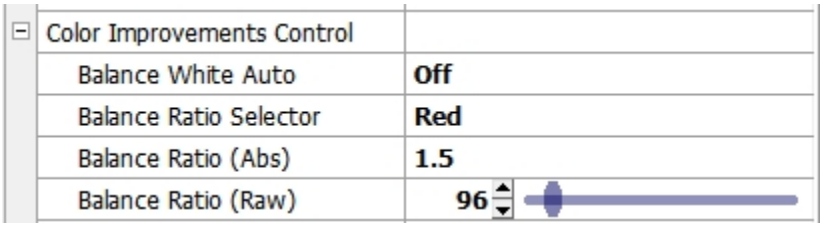


4. Save the settings. See To save the camera settings on page 105.

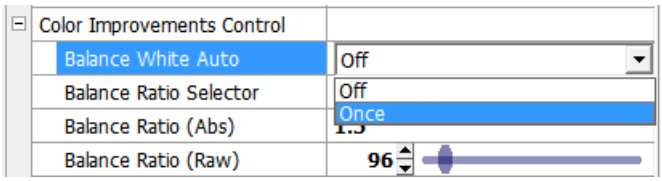
To adjust white balance

If you have a color camera, you also need to adjust its white balance.

1. Click **Color Improvements Control**.



2. Point the camera at a piece of white paper, so that the camera image is entirely white. Click in the field next to **Balance White Auto** and select **Once** from the list.

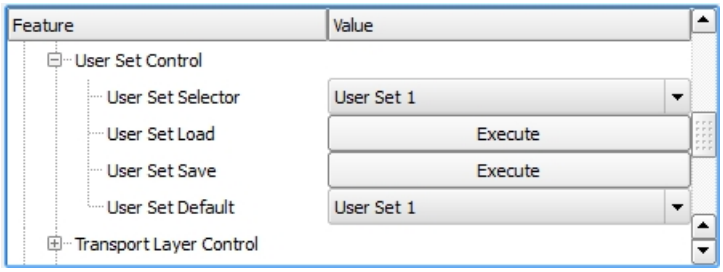


3. Save the settings (see below).

To save the camera settings

1. Click the **Stop** button.

2. In the **Features** panel, open the **User Set Control** item.
3. Select **User Set 1** from the **Configuration Set Selector** list.
4. Next to **User Set Save**, click **Execute**. The camera settings set in the previous steps are now saved under User Set 1.
5. From the **Default Startup Set** list, select **User Set 1**.



6. Close Pylon Viewer.

These settings will be used each time you start up Media Recorder.

WHAT'S NEXT?

The settings are now complete. Continue with the chapter **Media Recorder; general procedure** on page 37.

Appendix H

Media Recorder Settings and Filters

THE MEDIA RECORDER SETTINGS FILE

The settings you create for the different cameras are automatically saved to the file **Current settings.mrs**. When you restart Media Recorder these settings are used. To save your settings under a different name, open the **File** menu and select **Save Configuration As.....** This way you can create different settings for, for example, The Observer XT, EthoVision XT, and FaceReader. You can also use Cyrillic, Chinese, or Japanese characters for the configuration name. To go back to the default configuration, open the **File** menu and select **Open Configuration**. Browse to the file **Default Settings.mrs**. This file is read-only. You can find this file in the folder
C:\Users\Public\Documents\Noldus\Media Recorder.

When problems occur with the current settings, you can delete the file **Current settings.mrs** from the folder **C:\Users\Public\Documents\Noldus\Media Recorder**.
When you subsequently open Media Recorder, the file **Default Settings.mrs** is loaded and new file **Current Settings.mrs** is created in which the changes are saved.

To edit the settings file

You should never edit the file **Default settings.mrs**. Always edit a copy, or edit the file **Current settings.mrs**. To do so, use the tool **XML Notepad** that you can download from www.microsoft.com/downloads. Editing the file Current settings.mrs is only possible if Media Recorder is closed.

SETTINGS FOR EURESYS PICOLO H.264 FRAME GRABBER BOARD

The following settings can be changed to improve video quality or to increase the compression of the video file for video files created from analog cameras in combination with the Euresys Picolo H.264 frame grabber board.

- **GOPSize** — The GOP size is by default set to 15. It can be any value between 2 (largest file size) and 100 (smallest file size). The GOPSize defines the number of P- or B-frames between I- frames. Do not increase the GOPSize above 15, because that may lead to problems in The Observer XT, EthoVision XT, or FaceReader. If you enter an invalid value, like 1, Media Recorder will use the default value of 15.
- **Quality** — The Quality is by default set to 85. It can be any value between 1 and 100. 1 is the lowest quality, 100 the highest.
- **AvgBitRateXCh** — The average bit rate is by default set to 4000 Kb/s, when using 1 or 2 devices. For 3 devices it is 2666 Kb/s and for 4 devices it is 2000 Kb/s. This is because the maximum throughput of the Euresys card is 8000 Kb/s. The value can range between 1 and 4000. A low value may give low quality video when images are moving or when lighting conditions are not good. A high value may lead to missing frames.
- **MaxBitRateXCh** — The maximum bit rate is by default set to 4000 Kb/s when using 1 or 2 devices. For 3 devices it is 2666 Kb/s and for 4 devices it is 2000 Kb/s. This is because the maximum throughput of the Euresys card is 8000 Kb/s. The value can range between 1 and 4000. A low value may give low quality video when images are moving or when lighting conditions are not good. A high value may lead to missing frames.

Appendix I

Audio devices

WHICH AUDIO DEVICE SHOULD I USE?

The appropriate audio device depends on your setup. Take the following rules of thumb into account:

- For room settings, use one omnidirectional ceiling microphone.
- For meetings around a table, use one boundary layer table microphone.
- For usability research behind the computer, use a microphone close to the test participant, for example a wireless microphone or boundary layer table microphone.
- For very good audio quality for more than one test-participant, use a wireless microphone for each person.
- Audio quality strongly depends on the room settings. An expensive audio device does not by itself guarantee good audio. If the devices are not placed correctly, or if the acoustics in the room is bad, audio quality will be suffer.
- Do not place the microphone cables in the vicinity of 230 V electricity cables. If you, for example, place microphone cables in electrical conduits, the electricity can interfere with the audio.
- Use, sound absorbing material, like curtains, to avoid echoes on audio recordings.

PREAMPLIFIERS

The signal from a microphone is of low voltage. This signal needs to be amplified prior to further processing, like mixing or recording. This is done with a preamplifier. The strength of the signal that is amplified this way, is called line-level. When you subsequently connect the preamplifier to the sound card of your computer, select **Line in** when a message pops up that a new devices is detected.

The unamplified signal is very sensitive to noise. Therefore the preamplifier should be positioned as close to the microphone as possible.

When you use a digital video device and connect the audio directly to the sound card of the computer, the sound card of the computer functions as a preamplifier. So for recordings with digital devices, you can connect the microphone directly to the computer. When a message pops up that a new device is detected, select **Mic-in** as input source.

BALANCED CABLES

In professional audio, a balanced line or balanced signal pair is a transmission line consisting of two conductors of the same type. Both lines have equal impedances along their lengths and equal impedances to ground and to other circuits. Both

lines are twisted together and then wrapped with a third conductor (foil or braid) that acts as a shield. Common balanced cables are cables with XLR connectors. Balanced cables are the opposite of unbalanced cables. A coaxial cable is an example of an unbalanced cable.

The main advantage of the use of balanced lines is good rejection of external noise. Because the signal between the microphones and preamplifier is most sensitive to noise, it is most important to use balanced lines there.

PHANTOM POWER

Phantom power is a method to supply condenser microphones with power through microphone cables. Condenser microphones give better audio quality than other types of microphones, but they are more sensitive to noise. Preamplifiers and mixers can often supply microphones with phantom power.

GAIN

The gain of a preamplifier is the degree to which the amplifier magnifies the low-level input signal compared to its output signal. It is the ratio of the output voltage divided by the input voltage and is expressed in decibels (dB). The formula to calculate gain is 20 x Log (Voltage output/Voltage input). A gain of 6 dB doubles the voltage 2 times and a gain of 20 dB gives a 10 fold increase in the signal.

GAIN TRIM

For some amplifiers the gain can be selected in ranges. For example a LOW gain, gives a range from 18 to 38 dB. With the switch Gain trim, you can select the actual gain.

HIGH PASS FILTER

A high-pass filter (HPF) is a device in a preamplifier that passes high frequencies. Therefore it reduces the amplitude of frequencies lower than its cutoff frequency. It is sometimes called a low-cut filter or bass-cut filter.

CEILING MICROPHONE

Ceiling microphones are omni directional and are suitable for both speech as other sounds. Media Recorder supports the following ceiling microphone:

- Sennheiser MKE2-60-Gold-C (can also be used as table microphone)

The microphone needs 12-48V phantom power.

TABLE MICROPHONE

Table microphones are acoustically optimized for picking up speech. They are designed for use on conference tables, altars and lecterns. Media Recorder supports the following table microphones:

- Sennheiser ME35
- Sennheiser ME36
- Sennheiser MKE2-60-Gold-C (can also be used as ceiling microphone)
- Sennheiser e 912 S BK

The microphones need 12-48V phantom power.

WIRELESS MICROPHONE

Media Recorder supports the Sennheiser EW 312 G3 B series wireless microphone set. Use this wireless microphone set when there is more than one test participant, and/or the participants are moving. The microphone set comes with a clip-on microphone and a receiver.

The wireless microphone receiver continuously switches between antennas, checks which antenna picks up the strongest signal and selects this one. This means that the antennas can be mounted at different places. If for example the reception is poor when the wireless microphone is in the experiment room, you could decide to install one antenna in this room. If the quality of the received signal is bad, for example if the signal has to go through a wall, you can use the special coax cable for extending the antennas (50Ω). In general you want both antennas to use the same cable length. It is recommended to position the two antennas at an angle of 90°.

No phantom power is needed for the wireless microphone. The signal that comes from the receiver is preamplified.

KÖNIG CMP-MIC9

The König CMP-MIC9 is a small desk microphone. It is used in the Portable Observation Lab and Portable Usability lab. It can be connected directly to the sound card of the computer. Since the signal is not preamplified, choose **Mic-in** when a message pops up that a new devices is detected.

AUDIO MIXER

With an audio mixer you can adjust the audio streams before they go to Media Recorder. Furthermore, you can combine the audio streams from two or more microphones. Media Recorder supports the following audio mixers:

- Extron DMP 64
- Extron DMP 128

Appendix J

Picture by Picture resolution

The resolution of the recorded video is maximally 1920 x 1280. The resolution of a Picture by Picture video is a sum of the separate videos. However, if that exceeds a width of 1920 pixels or a height of 1280 pixels, the video resolution is adjusted proportionally. See the figure below for some examples of calculating the Picture by Picture resolution.

Example 1 — The width of the PbP video is the sum of the width of the separate videos. The height of the PbP video is the maximum height of the separate videos.

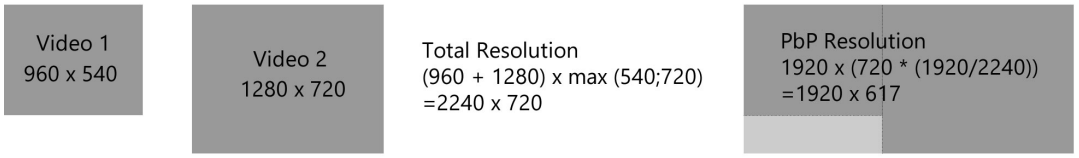
Example 2 — The total resolution is calculated in the same way as in Example 1. The width of the resulting video exceeds the maximum of 1920 pixels. Therefore both the width and height are reduced proportionally, resulting in a width of 1920 pixels.

Example 3 — The total width is the sum of the width Video 1 and 2. The height of is the maximum of the height of Video 1 and 2 plus the height of Video 3. Both the width and height of the resulting video exceed the maximum of 1920 x 1280. Therefore both the width and height are reduced proportionally, resulting in a width of 1920 pixels. The height is now smaller than the maximum of 1280 pixels.

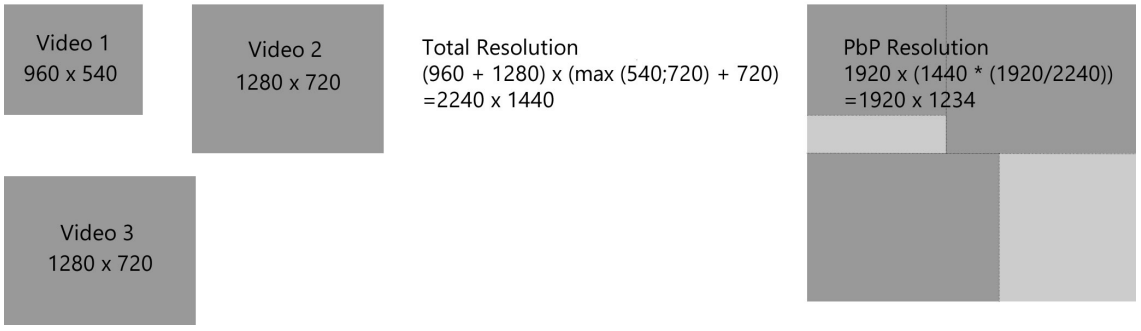
If the height would still have been be higher than 1280, the width and height would be reduced further, resulting in a height of 1280 pixels.

Example 1

Example 2



Example 3



Appendix K

Summary supported devices and settings

This table gives an overview of the devices that are supported with Media Recorder. It contains the maximum number of devices that can be used simultaneously, the maximum supported frame rate, resolution and recording time, and the software in which the videos can be used.

FaceReader
Media Recorder videos from all of the devices below can be analyzed by FaceReader, but the files from the individual devices have not been tested with this program.

DEVICES

See on page 114 for an overview of the supported combinations of devices.

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Analog PAL/CCIR Euresys Picolo U4 H.264	25	704 x 576	3	24	D	EthoVision XT
	Analog NTSC/EIA Euresys Picolo U4 H.264	29.97	704 x 480	3	24	D	EthoVision XT
	Analog PAL/CCIR Euresys Picolo U8 H.264	25	704 x 576	6 (cables 1,2,3, and 5,6,7)	24	D	EthoVision XT
	Analog NTSC/ EIA Euresys Picolo U8 H.264	29.97	704 x 480	6 (cables 1,2,3, and 5,6,7)	24	D	EthoVision XT
	DanioVision FireWire	60	640 x 480	1	24	D	EthoVision XT

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Basler GigE AC1300-60gm	30	853 x 640	4 Picture by picture	24	D	EthoVision XT
	Basler GigE AC1300-60gm	30	1280 x 960	4 Separate video files	24	D	EthoVision XT
	Basler GigE AC1300-60gm	30	1280 x 960	1	24	D	EthoVision XT
	Basler USB acA1920-155um	60	1920 x 1200	1	24	D	EthoVision XT
	Basler USB acA1920-155um	60	1920 x 1200	1	10	L	EthoVision XT
	Basler USB acA1920-155um	40	1920 x 1200	4	24	D	EthoVision XT
	Axis IP P5515	25	1920 x 1080	4	3	D	The Observer XT
	Axis IP M1054	25	1280 x 720	8	3	D	The Observer XT
	Axis IP M1054	25	1280 x 800	2	1	L	The Observer XT
	Axis IP M 5014	25	1280 x 720	1	3	D	The Observer XT
	Axis IP P5534	25	1280 x 720	1	3	D	The Observer XT
	Epiphan DVI2PCIe screen capture card	25	1920 x 1080	1	3	D	The Observer XT

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported on Desktop (D)/ Laptop (L)	Supported with
	Microsoft LifeCam Studio	30	1280 x 720	1	1	L	The Observer XT
	Epiphan DVI2USB 3.0 screen capture device	30	1920 x 1200	1	1	L	The Observer XT

COMBINATIONS

The following combinations of devices are supported:

	Device	Maximum supported frame rate (fps)	Maximum supported resolution of output file	Maximum number of devices	Desktop (D) Laptop (L)	Maximum supported recording time (hrs)	Supported with
	Axis IP P5515	25	1920 x 1080	3		3	The Observer XT
	DVI2PCIe	25	1920 x 1080	1			
	Microsoft LifeCam Studio	30	1280 x 720	1	L	1	The Observer XT
	DVI2USB 3.0	30	1920 x 1200	1			
	Microsoft LifeCam Studio	30	1280 x 720	1	L	1	
 *	Built-in screen capture.	30	1920 x 1080	1			

*Available with MR Screen Capture Module only.

Appendix L

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