Media Recorder 2.6

Service Manual

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1 Introduction

Media Recorder is a software program from Noldus Information Technology that can create MPEG-4 DivX files from the output of several digital input sources. In combination with the Picolo U4 or U8 H.264 board it can also create H.264 files from output of analog cameras.

Each device that is used in combination with Media Recorder has its own optimal settings. In the settings window of Media Recorder you can select settings for the frame rate, resolution, format and output of the video file. In addition, Media Recorder has an option to enter advanced video settings or advanced audio settings. These advanced settings windows contain the settings that are present on the drivers of the specific devices. Hence, the available settings differ for each device. It also differs per device whether or not the changes you make to the settings are stored in Media Recorder settings file or in the drivers or the device.

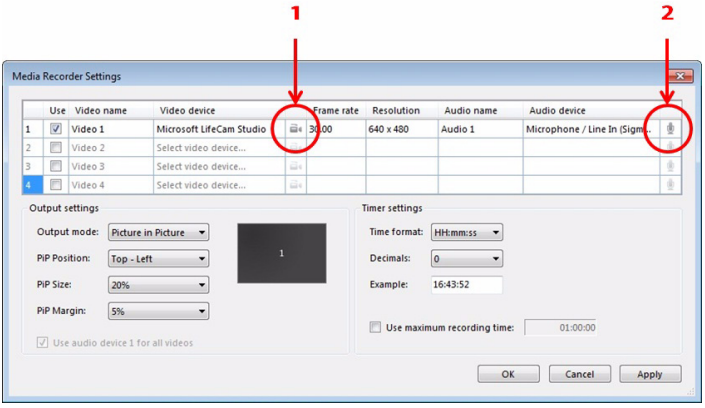


Figure 1 *The **Settings** window of Media Recorder, with the buttons for the advanced video settings (1) and the advanced audio settings (2).*

Because of this variety in available settings, it is not possible to give general guidelines for the optimal settings for all devices. The optimal

settings depend on the device, or the combination of devices used. In general, the default settings that Media Recorder chooses for a specific device, are recommended. However, for your specific need you may want to choose other settings like for example a specific frame rate, resolution, or color format.

Chapter 2 service manual gives an overview of the recommended settings for the devices that are supported with Media Recorder. For some devices, specific options apply for other settings as well, like for example for audio. These options are also described. In Chapter 4 on page 53 you find a table with a summary of the information from chapter 2.

Extensive background information on frame rate, resolution, format and audio can be found in the knowledge base on the website of Noldus IT. You can access this knowledge base via http://www.noldus.com/search-knowledge-base.

Digital video is a technology that is rapidly changing. New software and hardware is developing all the time and the best solution today might look very out of date tomorrow. Tomorrow, we may support other devices with Media Recorder than described in this service manual. Therefore, the information in this service manual is frequently updated. You can find the latest version of this manual on the download section of the Noldus IT website, which is http://www.noldus.com/downloads. You must register and log in in order to be able to download. You need your license number to do so.

FACEREADER

FaceReader 3 can analyze MPEG-4 DivX files. FaceReader 4 and 5 can analyze MPEG-4 DivX files and H.264 files. Media Recorder creates MPEG-4 DivX files from output of digital devices and H.264 files from the output of analog cameras together with an H.264 encoder board. Hence, FaceReader 4 and 5 can analyze all video files created with Media Recorder. However, video files from the individual devices described in Chapter 2 have not been tested with FaceReader.

2 Settings

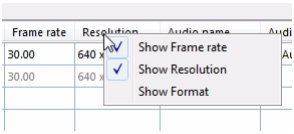
SUPPORTED VIDEO DEVICES

The type of camera you choose depends on the way you are going to use the video material. Each of the camera types has its advantages and restrictions. Specific cameras support EthoVision XT, or The Observer XT. If the same camera is supported for both software products, it is possible it has different specifications per product. This chapter describes per device for which other software the videos can be used, what the maximum recording time is and what the optimal settings are.

In general, the default settings of Media Recorder, when used with a specific device, are recommended. However, for a specific solution, you may want to choose other settings. This chapter gives an overview of the available options for the devices that are supported by Media Recorder. In addition, if special conditions apply for the device, these are also described below. On page 53 you find a table with an overview of the recommended options for the devices that are supported with Media Recorder. You find information on your specific device on the following pages:

FRAME RATE, RESOLUTION AND FORMAT

The columns for **Frame rate**, **Resolution** and **Format** in the **Settings** window of Media Recorder can be shown or hidden. To do so, right-click one of the column headers and select the preferred options. The **Format** column is hidden by default, because by default the optimal option is selected. What is shown in this column differs per device, for most of the devices the color space is shown. For some other devices it shows the format of the video images coming from the device. In some cases you may want to choose another color format than chosen by default, for example to increase the speed at which the video files are created. It is not possible to give general guidelines on this, because the available color formats differ per device and the optimal format depends on several fators like computer speed and number of cameras connected. Extensive background information on frame rate, resolution and color formats can be found in the knowledge base on the website of Noldus IT. You can access this knowledge base via http://www.noldus.com/search-knowledge-base.



NUMBER OF DEVICES

Media Recorder has extensively been tested with a Dell Precision™ T3600 quad core workstation and a Dell Precision™ M4700 quad core laptop. In the text below we describe how many cameras of the different types can be used simultaneously. These numbers are based on the workstation and laptop that we used for testing and on the cameras that we supply. However, these numbers depend on the processor speed of your computer, on the type of camera you use and on the camera settings. Also programs running in the background influence the speed of your computer and may affect the number of cameras that can be used simultaneously.

2.1 Analog cameras

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 digital cameras, except for GigE cameras, you often need an amplifier. Industrial analog cameras are in these cases often more suitable. Cable lengths of 30-50 meter are generally no problem. Also, signals from analog camera's 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. Furthermore, if you want to film in near infra-red (for instance for observing nocturnal animals), analog monochrome cameras are usually what you need.

Together with Media Recorder you can purchase an H.264 encoder card, to create video files in H.264/MPEG-4 AVC format from analog videos. Since the encoding is done by the encoder board, the performance of your computer does not suffer from creating H.264 video files. Together with the encoder board you receive a decoder to be able to play the H.264 back. This decoder is present on your installation disc of your Media Recorder and is installed during installation of Media Recorder.

CABLE LENGTH

One of the advantages of analog cameras is the possibility to have long cables between the camera and the encoder board. 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.

TESTED CAMERAS

Media Recorder has been tested with the analog cameras JVC TK-C9510E (PAL), Panasonic WV-CP500G (PAL), Panasonic WV-CP460 (NTSC), Ikegami ICD49 EIA (=monochrome NTSC) and the camera from the PhenoTyper Top unit.

NUMBER OF CAMERAS

For use with The Observer XT, you can use up to eight analog cameras at the same time together with Media Recorder. However, for use with EthoVision XT, this number is limited to three with the Picolo U4 H.264 board and six with the Picolo U8 H.264 board. This is caused by the fact that Media Recorder drops some frames when four analog cameras are used with default frame rate and resolution with the U4 board, or seven or eight with the U8 board. For The Observer XT this is not a problem, since the time information in the video is corrected with one of the filters (see Appendix A). However, for accurate tracking in EthoVision XT, all video frames are needed. When three analog cameras are used simultaneously with the U4 board, or six with the U8 board, no frames are dropped. If you use six cameras with the Picolo U8 H.264 board, use the cables numbered with 1,2,3 and 5,6,7.

If you have the Picolo U8 H.264 board for use with EthoVision XT:

- Do not use more than six cameras! Otherwise a large number of frames will be dropped, which can be as large as 25%.
- The card has two processors, one for cables 1,2,3,4 and one for cables 5,6,7,8. Do not use more than three cameras for each processor. Otherwise a large number of frames will be dropped, which can be as large as 25%. So with six cameras, use cables 1,2,3 and 5,6,7.

FRAME RATE AND RESOLUTION

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. With the Picolo U4, or U8 H.264 board, PAL/CCIR cameras have a frame rate of 25 fps and a resolution of 704 x 576 (PAL) or 752 x 582 (CCIR). NTSC/EIA cameras have a frame rate of 29.97 fps and a resolution of 704 x 480 (NTSC) or 768 x 494 (EIA).

MAXIMUM RECORDING TIME

For use with The Observer XT, the maximum recommended recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time. For EthoVision XT, the maximum recording time is 24 hours.

AUDIO

When you have the Picolo U4 or U8 H.264 card, you need microphones for the audio signal. You should not directly connect microphones to the audio inputs connected to the card. You need pre-amplifiers to amplify the microphone signals to Line Level (+0 dBu, 0.775 V). The option to use one audio signal for all videos is not available in Media Recorder when you use the H. 264 encoder card. If you want to use the same audio source for all videos, you need an audio splitting cable. Subsequently, you can connect the outputs of the audio splitting cable to the audio inputs that are connected to the H.264 encoder card. Audio recorded by the H.264 card is always mono.

You can only select the same channel number for the video input as for the audio input in the **Settings** window of Media Recorder. So if you connected a camera to the video cable No. 2, you should connect the microphone to the audio cable No. 2. You cannot use the audio of the Picolo U4 or U8 H.264 card together with a digital video device.

PICTURE BY PICTURE AND PICTURE IN PICTURE

If you choose **Picture by Picture**, or **Picture in Picture** with the Picolo U4 or U8 H.264 card, the format of the output file is not H.264, but MPEG-4 DivX. In these cases you can also use another audio source then the audio from the frame grabber card for your video. You can, for example, also use a microphone that is connected to the sound card of your computer.

2.2 USB cameras

USB cameras can be used to stream video images directly to Media Recorder and create MPEG-4 files. USB cameras are very easy to use. However, the settings are limited, for example, with many USB cameras you cannot zoom. However, 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, we recommend that you use a high-quality USB camera rather than a cheap webcam.

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. In the section for your specific device you find what has been tested.

SUPPORTED CAMERAS

Media Recorder has extensively been tested with the Microsoft LifeCam Studio and the industrial USB camera The Imaging Source DFK 21AU04. The drivers of these cameras are present on the Media Recorder installation disc. To install the driver of the Microsoft LifeCam Studio, open the Media Recorder setup browser from the installation disc and under Drivers - Media Recorder select Microsoft LifeCam. This way the latest driver is installed from the Microsoft website. Installation of this driver requires an internet connection.

USB cameras can only be used to create videos for The Observer XT and not for EthoVision XT.

ADDITIONAL USB CARD

USB cameras send a lot of digital information to the computer. All USB ports in the computer are controlled from one processing unit. The amount of transferred data may become too much for the USB port and its processing unit. The addition of a USB hardware card provides the PC with an extra port. This improves the overall performance of the PC and improves the synchronization of recordings with multiple USB cameras. We recommend to use a separate USB hardware card for each connected USB device.

USB 3

The supported cameras and devices do not require USB 3. However the M4700 laptop that can be delivered together with Media Recorder contains a USB 2 and a USB 3 port. If you use more than one USB device with Media Recorder, it is recommended to connect one of the devices to the USB 2 port and the other to the USB 3 port and use the device with the highest data rate to the USB 3 port. Because the supported USB cameras do not work with USB 3, the USB 3 port will function as a USB 2 port.

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 cameras directly to the USB ports on your computer.

HOT PLUGGING

If you disconnect a USB camera 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. Furthermore, you have to create the settings for this camera again. In general we recommend not to disconnect and connect cameras while the Media Recording

software is running. In addition, always connect the same USB device into the same port.

THE IMAGING SOURCE DFK 21AU04 USB CAMERA

The USB camera from The Imaging Source is only supported on a Windows 7 64 bit computer with Service Pack 1, not on a computer with Windows 8, or on a Windows 7 32 bit computer.

When you want to use The Imaging Source USB camera in combination with other USB devices, you need additional USB hardware cards for each device. The Imaging Source USB camera cannot be used in combination with a Screen Capture device.

Number of cameras

You can use two The Imaging Source DFK 21AU04 USB cameras simultaneously in combination with Media Recorder.

When you use two The Imaging Source USB cameras, you need to install a tool which prevents the notebook from going into an idle state during an observation. This tool can be found on the Media Recorder installation disc:

1. On the Media Recorder installation disc, browse to the folder **...\Drivers\Imaging Source\Tools**
2. Double-click the file **processoridlestatemanager_setup.exe** to install the tool.
3. Re-start the notebook.

   Every time you start the notebook, this tool is automatically started.

   To un-install the tool, open the **Control Panel**. Click **Programs and Features**. Select the tool and click **Uninstall**.

Frame rate and resolution

The recommended frame rate is 30 fps and the recommended resolution is 640 x 480. This is also the case when you use two cameras

simultaneously. These recommended settings are also the default ones.

Maximum recording time

The maximum recommended recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time.

Audio

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

Cable length

The option to extend the USB cable with cables with amplifiers has not been tested. However, tests on previous versions indicate that amplifiers are likely to cause delays in the signals and therefore lack of synchronization between multiple videos.

MICROSOFT LIFECAM STUDIO

You can use only one Microsoft LifeCam Studio webcam simultaneously in combination with Media Recorder.

Frame rate and resolution

The maximum recommended frame rate and resolution is 30 fps and 1920 x 1080.

Maximum recording time

The maximum recommended recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time.

Cable length

Extending the standard 1 m USB cable with three 5 m cables with amplifiers works well with Media Recorder.

2.3 Industrial FireWire cameras

Industrial FireWire cameras are designed to be used intensively and last very long. With Media Recorder you can create MPEG-4 files from the output of an industrial FireWire camera.

An important advantage of FireWire cameras is that the images are transferred uncompressed to Media Recorder. FireWire cameras meet the high standard required for working with digital video in EthoVision XT.

Handling FireWire cameras requires a bit more expertise than handling for example a webcam. Zooming and choosing, for example, the right aperture is done manually. You can change the lens of a FireWire camera, which is not possible with, for example, webcams.

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.

SUPPORTED CAMERAS

Media Recorder has extensively been tested with The Imaging Source DMK21AF04 (monochrome) and DFK31AF03 (color) FireWire cameras, and the Med Associates Basler camera (type A602f-BL, monochrome). The drivers of these cameras are present on the installation disc of Media Recorder. The video files from industrial FireWire cameras are supported with EthoVision XT only. You can only use one FireWire camera simultaneously with Media Recorder.

With some FireWire cameras you may get a warning when installing the drivers that the program Media Recorder is blocked. This is caused

by the security settings of your computer. To solve this, click “Unblock” in the dialog box that is shown.

FireWire connections can become loose. So make sure the cable is firmly attached and not under tension.

THE IMAGING SOURCE DMK21AF04 AND DFK31AF03

Frame rate and Resolution

The maximum recommended resolution for these cameras is 640x480. The maximum supported frame rate is 60 frames per second.

Number of cameras

You can use only one The Imaging Source FireWire camera simultaneously in combination with Media Recorder.

Maximum recording time

The maximum supported recording time is 24 hours.

MED ASSOCIATES BASLER CAMERA (TYPE A602F-BL)

Frame rate and resolution

The maximum supported frame rate and resolution of the Med Associates Basler camera is 100 fps and 640 x 480. It is possible to use the camera at a higher frame rate, but the camera has not been tested at such high frame rates. If you do increase the frame rate above 100 frames per second. lower the resolution. Otherwise Media Recorder will not record all frames, which leads to incorrect time information in EthoVision XT.

Number of cameras

You can only use one Med Associates Basler camera simultaneously with Media Recorder.

Maximum recording time

The maximum supported recording time is 22 hrs. Please note that the file size of a 22 hours recording is very large (at least 11 Gb).

2.4 IP cameras

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 via internet on your computer. The main disadvantage is that the video files are sent in fragments which results in less accurate time information. It depends on your research question whether the time information is accurate enough. If you for example score behavior in minutes in The Observer XT, the time information produced by IP cameras will be accurate enough. However, if you measure in fractions of seconds you may need to use another type of camera.

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.

SUPPORTED CAMERA

Media Recorder has extensively been tested with the Axis P5534, Axis P5512 and Axis M1054 camera. The drivers for these cameras are present on the installation disc of Media Recorder. You can install these drivers

by opening the setup browser of Media Recorder. Under **Drivers-Media Recorder**, select **Noldus Axis Video Filters**. Video files made with this camera can be used in The Observer XT and FaceReader, not in EthoVision XT.

INSTALLATION

If you ordered a computer and cameras from Noldus Information Technology when you purchased Media Recorder, the settings are already correct. If you bought your computer and cameras somewhere else, you must assign IP addresses to the cameras. The instructions for Axis IP cameras are described below. If you have other cameras, consult the camera manual. If you do not use the IP cameras with a dedicated network, consult your system administrator to obtain the correct IP addresses.

Install Axis Camera Management

1. Insert the disc that came with your Axis camera into the CD-/DVD-ROM drive of your computer.
2. In the window that opens automatically, click **Install Products**.
3. Click **Axis Camera Management** in the next window and follow the instructions on your screen.

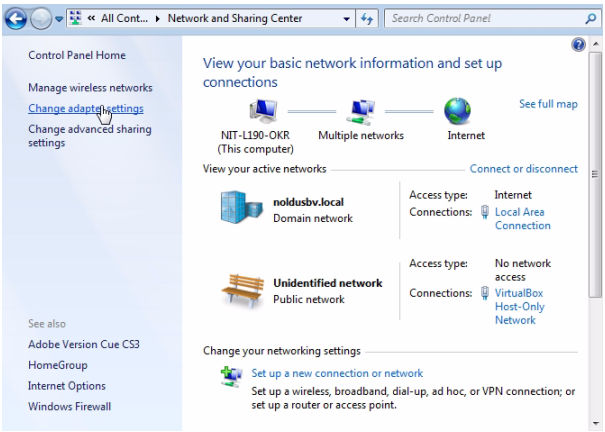
If no window opens automatically when you insert your disc into the DCD-ROM / DVD drive of your computer, browse the disc and run the file **ACMSetup**.

Set computer's IP address in range of camera

Temporarily set your computer in the IP range of your camera.

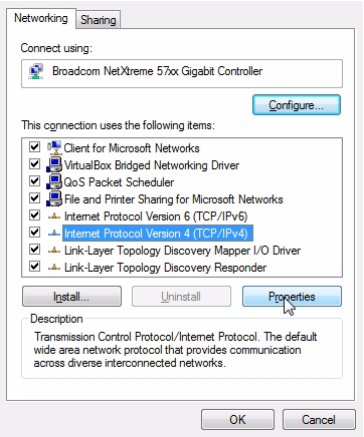
1. Open the Control Panel and go to **Network and Sharing Center**.

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



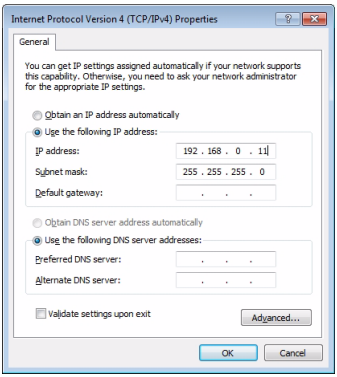
3. Right-click the **Local Area Connection** and click **Properties**. If your computer has more than one Local Area Connection, choose the one to which you are going to connect your IP camera. To check which one this is, remove the cable from this IP port on your computer. The LAN connection that gets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

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



5. **Important!** — Write down the settings in the **Internet Protocol Version 4 (TCP/IPv4) Properties** windows that appears, before you continue with the next step.

6. Click **Use the following IP address** and enter **192.168.0.11**. The **Subject mask field** is set automatically to **255.255.255.0**. Leave the other fields empty.

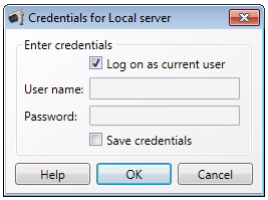


7. Click **OK** and close the Control Panel.

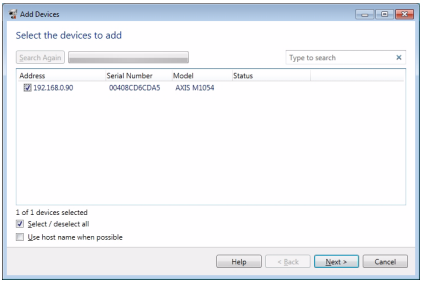
Set camera IP address

1. Connect one of your cameras to the ethernet port of your computer that you changed in step 6.
2. Open **Axis Camera Management Client**.
3. Click **Connect** in the **Axis Camera Management** window that opens.

4. Leave the fields empty in the **Credentials for Local server** window that appears and click **OK.**



5. The **Add Devices** window opens. Select the checkbox in front of your camera and click **Next**.

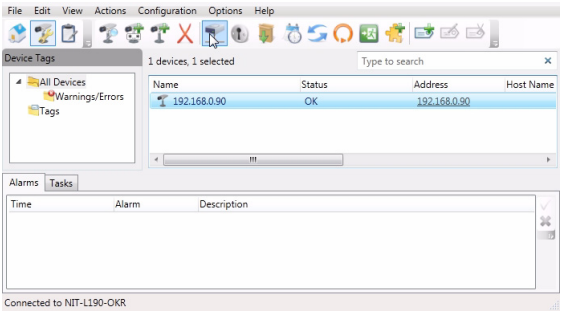


6. Optionally, set a user name and a password for your camera and click **Next** and then **Finish**.

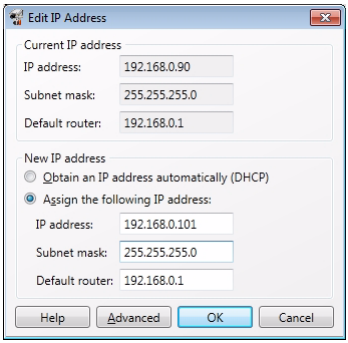
7. An **Add devices** window opens. When it disappears, select the camera and click the **Go to camera management** icon.

8. Click **OK** in the warning window that appears.

9. Click the **Assign IP address to selected devices** icon.



10. Select **Assign the following IP address** and enter the IP address **192.168.0.101**. The **Subject Mask** field is set automatically to 255.255.255.0. Do not change the **Default router** field. Then click **OK**



and close the **Axis Camera Management Client**.

11. If you have more than one IP camera, connect another one to your computer and repeat steps 2 to 10. Make sure the IP address is different from that of the first camera, use a consecutive number, so 192.168.0.102. Do this for all other IP cameras and make sure you use different IP addresses for all cameras.

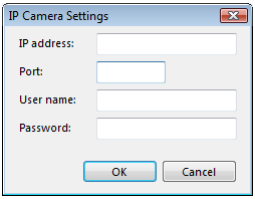
12. When done, close all windows and follow steps 1 to 4 on page 20.

13. Restore the settings you wrote down in step 5 on page 22. Click **OK** and close the Control Panel. Your cameras are now ready for use.

SELECTING THE IP CAMERA

When you have installed the drivers, you can select **Axis IP Camera (Axis HTTP Source Filter) in Media Recorder** from the dropdown list under **Video Device**. Click the video symbol next to the video name.

The **IP Camera Settings** window opens.



Enter the **IP address** for your camera. The default Port is *80*. The default **User name** is *root* and when you access the camera for the first time in the web browser, you are asked to set a **Password**. You need administrator rights to do so. If you lose this password you have to set your camera back to factory settings. See the camera user manual for details.

Adjusting advanced settings of the IP camera is possible from your internet browser, not from Media Recorder. To adjust settings, enter the IP address in your internet browser. Enter the user name and password. You can now zoom, turn the camera and adjust other settings.

With an IP camera Media Recorder may temporarily lose the signal, especially when you use the camera over internet. When this happens, a black screen with a warning triangle is shown in the preview window. Stop the recording, click the **Refresh** button and start recording again. We recommend to use an IP camera over a Local Area Network (LAN) instead of over internet.

FRAME RATE AND RESOLUTION

The maximum supported frame rate and resolution is depends on the type of camera and the number used simultaneously.

Type	Nr cameras	Frame rate	Resolution
Axis P5524	2	1280 x 800	30
	4	1280 x 720	30
Axis M1054	2	1280 x 800	30
	4	1280 x 720	30
	8	704 x 576	30
Axis P 5512	4	704 x 576	30

Check your camera manual for supported frame rates and resolutions if you want to use other ones than shown in the table above. Not all options given in Media Recorder may be supported by your camera.

NUMBER OF CAMERAS

A dedicated local network is needed for good synchronization. You can use 4 IP cameras simultaneously. A higher number of cameras has been tested for the Axis M1054. In combination with a POE+ switch, you can use 8 Axis M1054 cameras simultaneously if you use a maximum frame rate of 30 fps and a resolution of 704 x 576.

MAXIMUM RECORDING TIME

The maximum supported recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time.

AUDIO

You cannot select the audio source of an IP camera in Media Recorder. Connect a microphone to sound card of your computer instead and select that source in the Media Recorder settings. You can only use one

audio source simultaneously, even if you record from more than one IP camera. Select the option **Use audio from device 1 for all videos** in the **Media Recorder Settings** window to record the audio on all videos.

2.5 GigE cameras

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.

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.

SUPPORTED CAMERA

Media Recorder has extensively been tested with the Basler GigE camera (type AC1300-30gm). Video files created with this camera can be used in EthoVision XT. They have not been tested for use in The Observer XT.

INSTALLATION

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

Install the ethernet card

If you ordered a computer from Noldus Information Technology when you purchased Media Recorder and the Basler GigE camera, it came with an ethernet card. The card has already been installed and tested. If you bought your computer somewhere else, you will have to install the ethernet card yourself.

To install the ethernet card:

1. Turn off your computer and all connected peripherals, such as the monitor and printer.
2. Unplug the computer and its peripherals.
3. Remove the PC's case according to the instructions provided in the PC's user manual.

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.

4. Select a free expansion slot (the smaller PCIe slot), and remove the corresponding extension cover.

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.

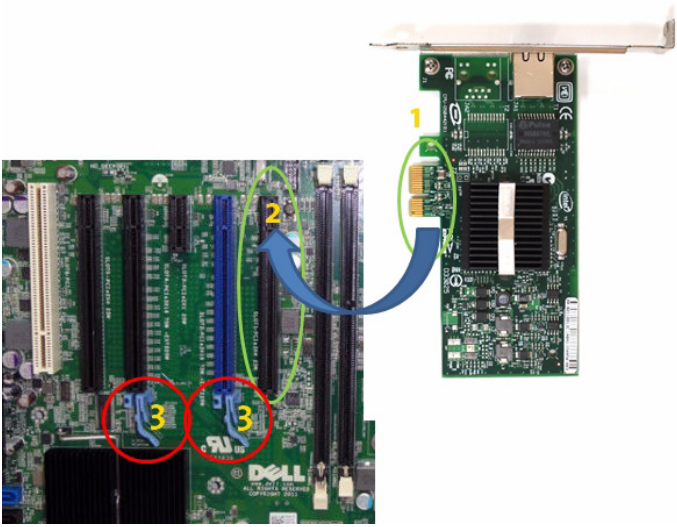


Figure 2 *Installing the ethernet card into a Dell Precision T3600 workstation. Insert the connector of the card (1) into the slot (2). Do not use one of the slots with a blue hook (3), since these are graphics slots.*

Do not insert the card into one of the graphics slots (indicated with a 3 in Figure 2). Use the black slots next to the graphics slots (see Figure 2). If the computer has more than one free PCIe slot, for example 2.0 and 3.0, use the fastest one, indicated by the number under the slot.

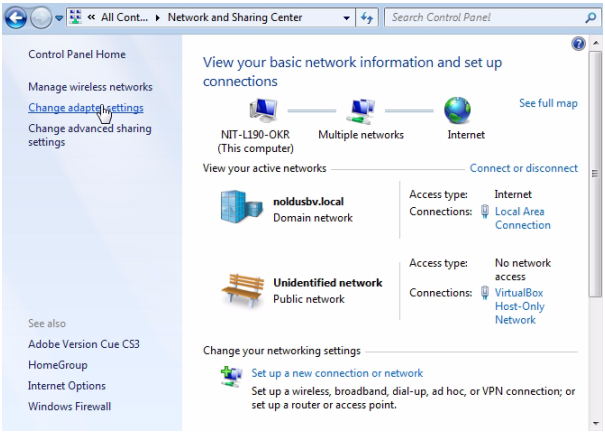
6. Fix the card to the chassis and re-fit the computer's cover.

7. Install the camera drivers from the installation disc. In the setup browser, under **Drivers - Media Recorder**, select **Med Associates - Basler**. This is the same driver as for the Med Associates Basler FireWire camera.

8. 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.

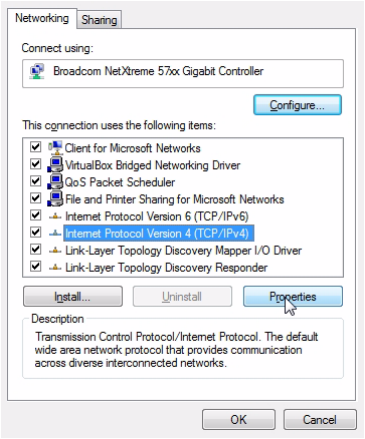
Create settings for the ethernet card

1. Open the Control Panel.
2. Go to **Network & Internet** and then **Network and Sharing Center**.
3. Click **Change adapter settings** on the left side of your window.

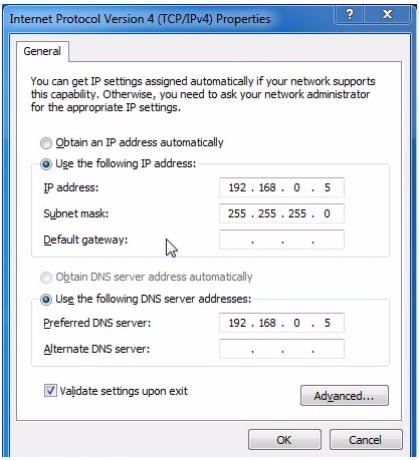


4. Right-click the **Local Area Connection** and click **Properties**. If your computer has more than one Local Area Connection, choose **Basler GigE Vision Adapter**. Write down the number of this connection.

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



6. 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**.

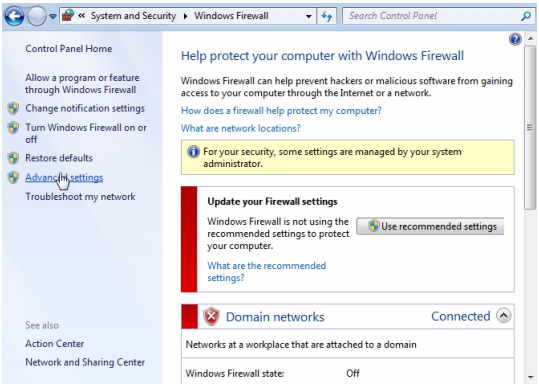


7. A **Windows Network Diagnostics** window appears. Click **Close** when it is finished. Then close all windows.

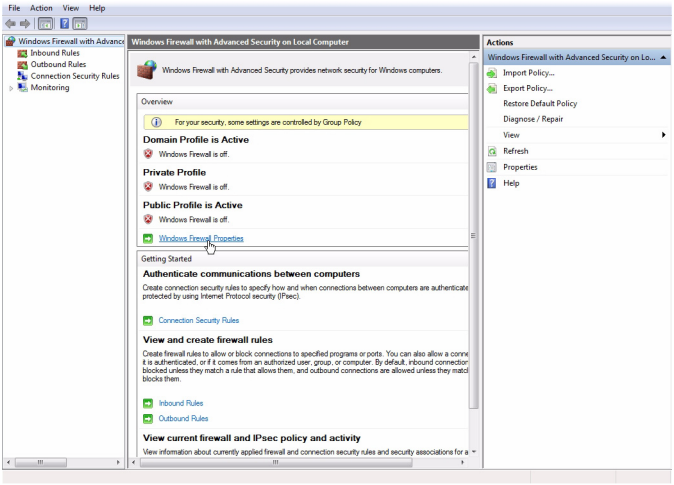
Disable the Windows Firewall for the Ethernet card

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.

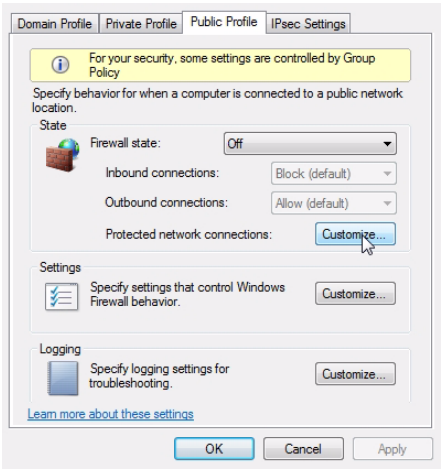


4. Under **Overview**, click **Windows Firewall Properties**.



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 4 on page 31 for the correct local area connection. Click **Close**.

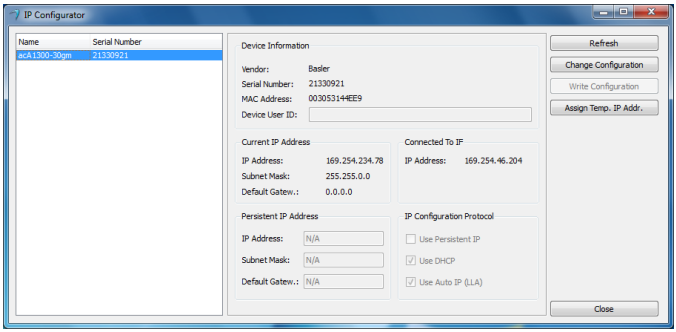
8. A warning balloon appears in the bottom-right of your window. Ignore this message.

9. Close all windows.

Create an exception in the Windows Firewall for the Basler camera drivers

1. Double-click the **Pylon IP Configuration tool** icon on the desktop.

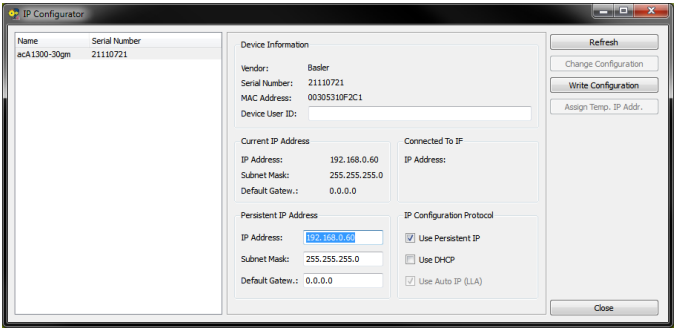
2. Click **Change Configuration**.



3. A Firewall warning message appears. Click **Allow access**.

   If a warning message appears that the connection has failed, click **Force IP** address.

4. Fill in the details in the fields next to **IP Address** and **Subnet Masks** as shown in the figure below.



5. Click **Write configuration**. A dialog box appears. Click **Close** after it has disappeared.

Configure the camera

With this procedure you make sure the camera view is centered. If you create these settings in Media Recorder, they are not stored in the camera drivers.

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

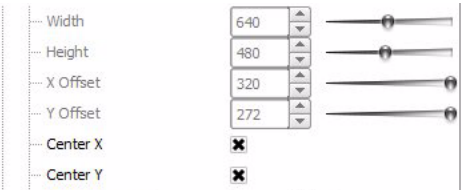
2. Start the **Basler Pylon Viewer** software that comes with the GigE camera. A **Camera Link Configuration** message appears. Click **Yes**.

   Note — The Basler Pylon Viewer software is installed automatically when you install the camera drivers (see page 30).

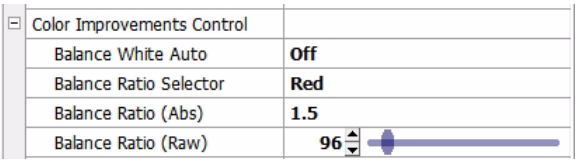
3. In the **Devices** panel, under **GigE**, select the Basler camera.
4. Open the **Tools** menu, select **Options** and set the **User level** to **Expert** or **Guru**.
5. To preview the camera image, click the **Continuous Shot** button on the toolbar. 

   In order to continue with the procedure, click the **Stop Grab** button. 

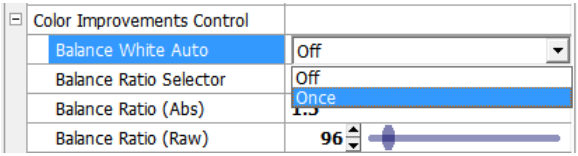
6. In the **Features** panel, open the **AOI Controls** item.
7. Select both options **Center X** and **Center Y**.



8. If you have a color camera, you also need to adjust its white balance. If you have a monochrome camera, continue with step 11.
9. Click **Color Improvements Control**.



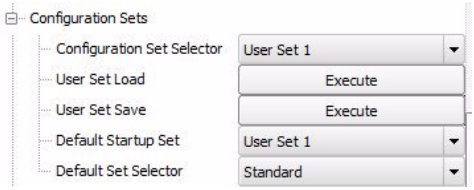
10. Point the camera at a piece of white paper, so that the camera image is entirely white.Click in the field next to **Balance White Auto** and select **Once** from the list.



11. Save the settings:
    a In the **Features** panel, open the **Configuration Sets** item.
    b Select **User Set 1** from the **Configuration Set Selector** list.

c Next to **User Set Save**, click **Execute**. The camera settings set in the previous steps are now saved under **User Set 1**.

d From the **Default Startup Set** list, select **User Set 1**.



14. Close **Pylon Viewer**.

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

FRAME RATE AND RESOLUTION

The maximum recommended frame rate and resolution is 30 fps and 1280 x 960.

NUMBER OF CAMERAS

You can use only one GigE camera simultaneously together with Media Recorder.

MAXIMUM RECORDING TIME

The maximum supported recording time is 22 hrs. Please note that the file size of a 22 hours recording is very large (at least 11 Gb).

2.6 Screen capture devices

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. The device is connected to the video card of the test PC to capture the image on the screen. Media Recorder supports two type of screen capture devices, the DVI2USB 2.0 that is connected to the USB port of the recording computer, and a DVI2PCIe frame grabber board that is inserted in a PCI express slot in the recording computer. The frame grabber board DVI2PCIe has a much bigger bandwidth than the DVI2USB 2.0. Therefore it can record with a higher frame rate than the DVI2USB 2.0 (see page 40).

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.

SUPPORTED DEVICES

Media Recorder has extensively been tested with the Epiphan screen capture devices DVI2USB 2.0 and DVI2PCIe. The DVI2USB 2.0 device is a frame grabbing device with which you connect the output of the video card of the test computer to a USB port of the recording computer. The DVI2PCIe is a frame grabber board that is installed in a PCI express slot of the recording computer. The video card of the test computer is connected with a DVI cable to this frame grabber board.

Video files from the screen capture devices can only be used in The Observer XT.

DVI2USB 2.0

The DVI2USB 2.0 has inputs for VGA and DVI signals. The driver of this device is present on the Media Recorder installation disc. Open the setup browser from the installation disc and under **Drivers - Media Recorder** select **Epiphan DVI2USB**. You can only use one DVI2USB 2.0 device simultaneously in combination with Media Recorder.

When you install the driver for the screen capture device DVI2USB, a question appears whether you want to check for updates. Do not download an update of the driver for the screen capture devices from the Epiphan website! Otherwise, the screen capture devices may not work properly in combination with Media Recorder.

DVI2PCIE

The DVI2PCIe has inputs for DVI, VGA and HDMI signals, but it has only been tested with DVI input. The driver of this device is present on the Media Recorder installation disc. Open the setup browser from the installation disc and under **Drivers - Media Recorder** select **Epiphan DVI2PCIe**. You can use up to two DVI2PCIe devices simultaneously in combination with Media Recorder.

Do not download an update of the driver for the DVI2PCIe screen capture device! Otherwise, it may not work properly in combination with Media Recorder.

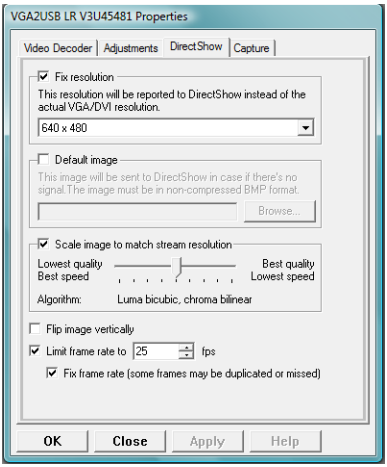
FRAME RATE AND RESOLUTION

If you use the screen capture devices DVI2USB or DVI2PCIe, by default the resolution of the screen of the test computer is used. To change the recorded resolution, change the resolution of the monitor of the test computer.

To record enough screen detail, we recommend to use these devices at high resolution. Media Recorder supports a resolution of 1920 x 1200 and 60 fps. However, the actual frame rate of the recorded video is limited by the bandwidth of your USB connection and may be much lower than 60 frames per second. With a resolution of 1920 x 1200, the actual frame rate may be as low as 5 fps. The DVI2PCIe has a much larger bandwidth than the DVI2USB and therefore records at a higher frame rate (>15 fps), even at high resolution. For the DVI2PCIe, Media Recorder supports a resolution of 1920 x 1200.

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 installation of the drivers of the screen capture device, the icon **Epiphan Frame Grabber Configuration** is added to the desktop. Double-click this icon and open the tab **DirectShow**.

Select the checkbox next to **Fix resolution**.



OTHER SETTINGS

The screen capture devices can be used to capture images of online games. However, the screen resolution of the game menus often

differs from the resolution of the games themselves. If you select Fix resolution (see above) and the resolution of the screen of the test computer changes by opening or closing a game menu, only part of the menu or part of the game window may be recorded. Therefore, we recommend to check beforehand if everything is recorded if you want to capture images of online games.

AUDIO

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

MAXIMUM RECORDING TIME

The maximum supported recording time is three hours.

2.7 TerraTec Grabby

TerraTec Grabby is an easy to use device for converting analog video to a digital file. The TerraTec Grabby has an analog input and a USB output. Media Recorder can create MPEG - 4 DivX files from the output of the TerraTec Grabby. The drivers for the TerraTec Grabby are present on the installation disc of Media Recorder. Video files created with the TerraTec Grabby can be used in The Observer XT, not in EthoVision XT.

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 did not test extending the USB cable of the TerraTec Grabby with a cable with amplifier. The cable

between the analog camera and the TerraTec Grabby can have long length. See page 10 for more details.

FRAME RATE AND RESOLUTION

The supported frame rates and resolution for the analog to USB converting device TerraTec Grabby are the standard resolutions and frame rates for NTSC and PAL cameras. These are 720 x 576 and 25 frames per second for PAL cameras and 720 x 480 and 29.97 frames per second for NTSC cameras.

AUDIO

The audio signal of the TerraTec Grabby has a delay of approximately 2 seconds compared to the video signal. Therefore the audio signal of the TerraTec Grabby should not be used. Connect a microphone to the sound card of the computer instead and select that source in the Media Recorder settings.

NUMBER OF DEVICES

You can use only one TerraTec Grabby device with Media Recorder.

MAXIMUM RECORDING TIME

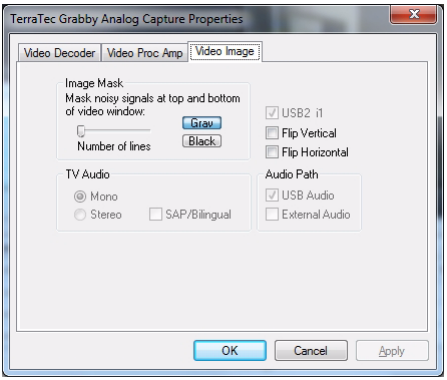
The maximum supported recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time.

OTHER SETTINGS

Irregular lines in video

If you see irregular lines in the video at the top and bottom of the screen, click the camera button in the Media Recorder Settings window to open the **Advanced Settings** window.

Go to the tab **Video Image**. Move the scroller under **Image Mask** a little bit to the right. This masks a number of lines at the bottom and top of the video. Select whether you want these lines to be changed to black or grey.



2.8 Canopus ADVC-55

The Canopus ADVC-55 is a device for converting an analog video signal to a DV signal, using a FireWire connection. Media Recorder can create

MPEG-4 DivX files from the output of this device. The files created with this device can be used in The Observer XT, not in EthoVision XT.

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 the Canopus ADVC-55 with Media Recorder.

FRAME RATE AND RESOLUTION

The supported frame rates and resolution for the analog to DV converting device Canopus ADVC-55 are the standard resolutions and frame rates for NTSC and PAL cameras. These are 720 x 576 and 25 frames per second for PAL cameras and 720 x 480 and 29.97 frames per second for NTSC cameras. By default a frame rate of 25 frames per second and a resolution of 720 x 576 is selected.

AUDIO

Media Recorder cannot convert audio of the Canopus ADVC-55. Connect a microphone to the sound card of your computer instead and select that source in the Media Recorder settings.

NUMBER OF DEVICES

You can only use one Canopus ADVC-55 simultaneously with Media Recorder.

MAXIMUM RECORDING TIME

Maximum supported recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video time.

2.9 Combinations

The supported combinations of devices are described below.

THREE ANALOG CAMERAS AND A SCREEN CAPTURE DEVICE

You can use a combination of three analog cameras that are connected to the Picolo U4 H.264 board and a DVI2USB or a DVI2PCIe screen capture device. The recommended settings are the same as for the individual devices. Audio for the videos from the analog cameras come from microphones with pre-amplifiers that are connected to the audio channels on the H.264 board. Audio for the screen capture device comes from a microphone that is connected to the sound card of the computer with Media Recorder. For more details, see Analog cameras on page 10 and Screen capture devices on page 39. Maximum recording time is 3 hours. For videos with this length, the time stamps in The Observer XT are synchronous with the video times.

TWO TOP-VIEW AND TWO SIDE-VIEW ANALOG CAMERAS

A combination of two top-view cameras from the PhenoTyper Top Unit and two side-view Ikegami ICD-49E (EIA= monochrome) or 2 JVC TK-C9510E (PAL) cameras is supported with Media Recorder 2.5. The resolution of the side-view cameras was lowered to 352 x 288 (CCIR) or

352 x 240 (EIA). The videos from the top units are suitable for use in EthoVision XT. The videos from the side-view cameras are suitable for use in The Observer XT. The maximum supported recording time is 24 hours.

2.10 Switchers

Media Recorder 1 did not support switching the analog video input during a recording with a matrix switcher or a quad video processing unit. Media Recorder 2.5 supports the Altinex MT 105-112 16x16 video switcher and the Tracksys VQ - 403C Quad Unit.

3 Supported audio devices

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.

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 **Microphone** as input source.

When you use the Picolo U4, or U8 H.264 card, the signal should be preamplified to line level (+0 dBu, 0.775 V).

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. 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.

Figure 3 *Balanced cable with male and female XLR connectors*

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. You cannot connect a balanced line to the Picolo U4 H.264 card, so you should use an unbalanced cable between the preamplifier and the H.264 card.

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

Media Recorder supports the Sennheiser MKE 2 P-C microphone, which is a high-quality, sub-miniature clip-on lavalier microphone. It is suitable for both speech and instrument miking applications. It can be directly attached to equipment with 12 – 48 V phantom powering.

The Ceiling microphone is connected with a balanced XLR cable to a RDL FP MP1 microphone preamplifier. This preamplifier must be set to deliver 24 V Phantom power (see switch under **Off, 12V, 24V** in Figure Figure 4). Furthermore the **Gain** must be set to **High Gain**, **Gain trim** to

the 5th increment and the switch under **Low cut** must be switched to **IN** (see High-pass filter above).

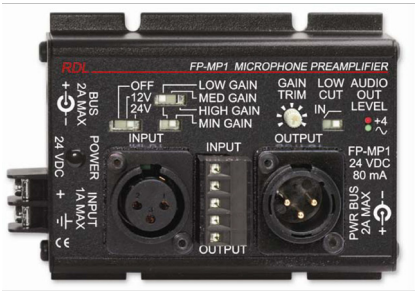


Figure 4 *RDL FP MP1 Microphone preamplifier.*

TABLE MICROPHONE

Media Recorder supports the Sennheiser E912bk Boundary layer microphone. This microphone is acoustically optimized for picking up speech. It is designed for use on conference tables, altars and lecterns. It needs 48V phantom power. Because the RDL FP MP1 preamplifier can supply a maximum of 24V phantom power, the microphone is connected with a balanced XLR cable to an RDL FP MPA2 phantom adapter. This adapter is set to 48 V. This phantom adaptor is connected with a balanced XLR cable to the RDL FP MP1 preamplifier. The **Phantom Power** must be set to **Off**, the **Gain** set to **High**, **Gain trim** turned to **maximum** and the **Low cut** switch must be set to **IN**.

WIRELESS MICROPHONE

Media Recorder supports the Sennheiser G3 EW312 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 **Microphone** when a message pops up that a new devices is detected.

RDL FP-MX3R REMOTE CONTROLLED LINE LEVEL MIXER

Media Recorder supports the RDL FP-MX3R audio mixer. With this 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. A maximum number of 3 microphones is supported.

4 Overview supported settings

Table 2 below gives an overview of the supported settings of the devices that are supported with Media Recorder. Also the number of devices that can be used simultaneously with Media Recorder, the maximum supported recording time, and the software in which the videos can be used are given. Media Recorder videos from all of the devices below can be analyzed by FaceReader 4 and 5, but the files from the individual devices have not been tested with FaceReader

Table 3 gives an overview of the supported combinations of devices and the recommended settings.

Table 1 *Supported settings for devices supported with Media Recorder.*

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported with *
	**Analog cameras PAL or CCIR** with Picolo U4 H.264 board**	25	704 x 576	4	3	The Observer XT
				3	24	EthoVision XT
	**Analog cameras NTSC or EIA** with Picolo U4 H.264 board**	29.97	704 x 480	4	3	The Observer XT
				3	24	EthoVision XT
	**Analog cameras PAL or CCIR** with Picolo U8 H.264 board**	25	704 x 576	8	3	The Observer XT
		25	704 x 576	6 (cables 1,2,3, and 5,6,7)	24	EthoVision XT
	**Analog cameras NTSC or EIA** with Picolo U8 H.264 board**	29.97	704 x 480	8	3	The Observer XT
		29.97	704 x 480	6 (cables 1,2,3, and 5,6,7)	24	EthoVision XT
	**Microsoft LifeCam Studio**	30	1920 x 1080	1	3	The Observer XT
		30	640 x 480	2	3	The Observer XT
	**The Imaging Source USB camera DFK 21AU04**	30	640 x 480	2	3	The Observer XT on Windows 7 64 bit only

Table 1 *Supported settings for devices supported with Media Recorder.*

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported with *
	**The Imaging Source FireWire camera DMK 21AF04 monochrome**	60	640 x 480	1	24	EthoVision XT
	**The Imaging Source FireWire camera DFK31AF03 color**	60	640 x 480	1	24	EthoVision XT
	**Med Associates Basler Camera (FW)**	100	640 x 480	1	22	EthoVision XT
	**Axis IP P5534 camera**	30	1280 x 720	4	3	The Observer XT
		30	1280 x 800	2	3	The Observer XT
	**Axis IP M1054**	30	704 x 576	8	3	The Observer XT
			1280 x 720	4	3	The Observer XT
			1280 x 800	2	3	The Observer XT
	**Axis IP 5512**	30	704 x 576	4	3	The Observer XT
	**Basler GigE camera AC1300-30gm)**	30	1280 x 960	1	22	EthoVision XT
	**DVI2USB 2.0**	default	default	1	3	The Observer XT
	**DVI2PCIe**	default	default	2	3	The Observer XT
	**Canopus ADVC-55 PAL**	25	720 x 576	1	3	The Observer XT
	Canopus ADVC-55 NTSC	29.97	720 x 480	1	3	The Observer XT
	**TerraTec Grabby PAL on desktop**	25	720 x 576	1	3	The Observer XT

Table 1 *Supported settings for devices supported with Media Recorder.*

Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported with *
 **TerraTec Grabby NTSC on desktop**	29.97	720 x 480	1	3	The Observer XT

* FaceReader 5 can analyze all video files created with Media Recorder, but the files from the individual devices have not been tested with FaceReader.

**CCIR and EIA are TV standards for monochrome cameras. PAL and NTSC are TV standards for color cameras.

Table 2 *Combinations supported with Media Recorder*

	Device	Maximum supported frame rate (fps)	Maximum supported resolution	Maximum number of devices	Maximum supported recording time (hrs)	Supported with
	**PhenoTyper Top Unit**	25 (CCIR)* 29.97 (EIA)*	704x576 (CCIR) 704x480 (EIA)	2	24	EthoVision XT
	**Ikegami ICD-49E**	29.97 (EIA)*	352x240 (EIA)	2		The Observer XT
	**PhenoTyper Top Unit**	25 (CCIR)* 29.97 (EIA)*	704x576 (CCIR) 704x480 (EIA)	2	24	EthoVision XT
	**JVC TK-C9510E**	25 (PAL)	352x288 (PAL)	2		The Observer XT
	**Analog camera**	25 (PAL)* 29.97 (NTSC)*	704x576 (PAL) 704x480 (NTSC)	3	3	The Observer XT
	**DVI2USB 2.0 or DVI2PCIe**	default	default	1		

*CCIR and EIA are TV standards for monochrome cameras. PAL and NTSC are TV standards for color cameras.

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5 Upgrading from Media Recorder 2.0 to 2.5

Customers that upgrade from Media Recorder 2.0 to version 2.5 should pay attention to the following important notes:

- Since Media Recorder 2.5 comes with several new device drivers, it is important that besides installing Media Recorder 2.5, you also install the drivers for those devices. You can download the drivers from http://www.noldus.com/restricted/media-recorder-25/drivers.
- Customers that have a 32 bit version of Windows 7 and upgrade Media Recorder to version 2.5 should realize that most supported devices have been tested with the 64 bit version of Windows 7. We expect that the supported devices also work with Windows 7 32 bit, but this has not been thoroughly tested.
- The video files that were made with Media Recorder 2.0 were stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder. The video files that are made with Media Recorder 2.5 are stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder\Video Files. Video files that were made with a Media Recorder 2.0 remain in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder.
- After upgrading to Media Recorder 2.5, new settings should be made for the cameras.
- Customers with an existing portable lab on a Windows 7 32 bit laptop should not upgrade Media Recorder to version 2.5. Synchronization problems were found with Media Recorder 2.5 on a Windows 7 32 bit laptop. No such problems occur with Media Recorder 2.0.

NEW DEVICES

The following new devices are supported in Media Recorder 2.5.

- The Picolo U8 H.264 encoder card (see page 10).
- The Imaging Source DFK31AF03 FireWire camera (see page 18).
- The DVI2PICe screen capture device (see page 40).
- The Axis P5534, P5512 and M1054 IP cameras (see page 19).

6 Upgrading from Media Recorder 1 to 2.5

- If you have Media Recorder 1 on a computer running Windows XP, and you want to upgrade, you should either upgrade to Windows 7 64 bit with Service Pack 1 or Windows 8 64 bit, or install Media Recorder on a computer that has one of these operating systems.
- If you are using the H264 card and recording audio, in Media Recorder 1 you could do this with the computer sound card input. In Media Recorder 2.5 you must use the audio inputs of the card.
- Screen capture with a VGA2USB device was supported in Media Recorder 1, but is no longer officially supported in Media Recorder 2.5. We do support DVI screen capture and VGA screen capture with the DVI2USB 2.0 device. We also support DVI screen capture with the DVI2PCIe device.
- The Logitech webcam that was supported in Media Recorder 1 is no longer supported. We do support the Microsoft LifeCam webcam.
- The Imaging Source Analog 2 USB device that was supported in Media Recorder 1 is no longer supported. We do support the Terratec Grabby.
- The video files that were made with Media Recorder 1 were stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder. The video files that are made with Media Recorder 2.5 are stored in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder\Video Files. Video files that were made with a Media Recorder 1 remain in the folder C:\Users\Public\Public Documents\Noldus\Media Recorder.
- After upgrading to Media Recorder 2.5, new settings should be made for the cameras.

7 Upgrading to Media Recorder 2.6

- Media Recorder 2.6 is is especially developed for customers that want to record with more than 4 IP cameras, or more than 6 analog cameras for use in The Observer XT. Other customers with Media Recorder should not upgrade to version 2.6.
- Media Recorder 2.6 has only been tested without audio with AXIS 1054 IP cameras and analog cameras.
- Upgrading from a previous version of Media Recorder always requires an upgrade key for the license.
- Customers that upgrade from Media Recorder 2 should also read the chapter “Upgrading from Media Recorder 2.0 to 2.5” on page 57.
- Customers that upgrade from Media Recorder 1 should also read the chapter “Upgrading from Media Recorder 1 to 2.5” on page 59.

8 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/).

9 Filters

In Media Recorder 2.5, two filters are used to synchronize audio and video streams with The Observer XT. These are:

- **The MediaLooks A/V sync filter** — This filter synchronizes the audio and video in one media file by changing the time stamps of a video frame. By changing this time stamp the frame can be positioned accurately near the corresponding time stamp of the audio stream. This way there will be synchronicity between audio and video, even in recordings as long as 24 hours.
- **The Time Stamp Correction Filter** — This filter corrects the time stamps from video devices that drop frames. This filter looks at the actual time stamp, compares it with the time stamp of the received frame and, if needed, corrects the time stamp of the received frame. This way the video file will have a correct duration, even if frames are dropped.

Both filters improve synchronicity, but in a different way. Therefore these filters are not used together. Below is described which filter is used in which situation.

- **The MediaLooks A/V sync filter** — If an audio source is selected in the settings dialog.
- **The Time Stamp Correction Filter** — If 'No Audio' is selected in the settings dialog.

However, there are exceptions for some specific video devices. These exceptions are configured in the file **VsSettings.xml**, that is present in the folder **C:\ProgramData\Noldus\Media Recorder\2**. The table below shows the configuration of specific devices in the file **VsSettings.xml**

Table 3 *Configured settings in the file VsSettings.xml for three devices.*

Device name	MediaLooks A/V sync filter	Time Stamp Correction Filter
H.264 encoder board	never	never
Basler cameras (both FireWire and GigE)	always	always
DVI2USB/DVI2PCIe	Only when audio is selected in settings	Only when audio is selected in settings

10 Synchronization with The Observer XT

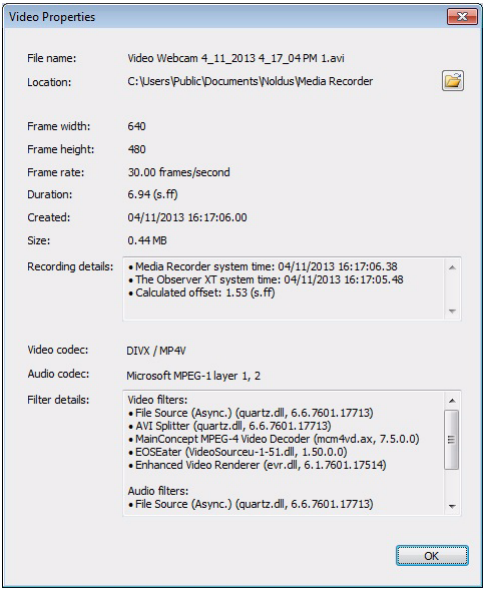
When you use both Media Recorder and The Observer XT 11.5, it is recommended to start and stop Media Recorder with commands from The Observer XT and use automatic linking to link the videos to the observation. This way the videos are automatically synchronized with the events in The Observer XT.

If you import the videos manually in the observation, or you have an older version of The Observer XT, you need to synchronize the observation and videos using an event that is recognizable in the videos. Also if you use Media Recorder on another computer than the one with The Observer XT and use PsExec to send commands with The Observer XT, you need to synchronize the observations and videos manually.

STARTING MEDIA RECORDER WITH THE OBSERVER XT

When you start and stop Media Recorder with The Observer XT, time information is sent from The Observer XT to Media Recorder. This information is included in the video file. When the video automatically linked to the observation, the video file is automatically synchronized with the observation, using the time sent by The Observer XT. The

Video Properties window shows The Observer XT system time, which is used for automatic synchronization.



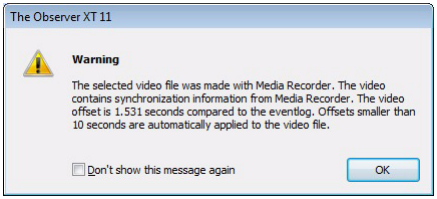
Disabling sending time information by The Observer XT.

In some cases you may want to disable the time sent by The Observer XT. For example if you have problems with the imported videos and our support department asks you to disable the automatic synchronization. To do so, copy the file vxsettings.mrs, rename the original file to vxsetting.old and open the new file with an xml editor. Change the line **<WriteMMD>true</WriteMMD>** to **<WriteMMD>false</WriteMMD>**.

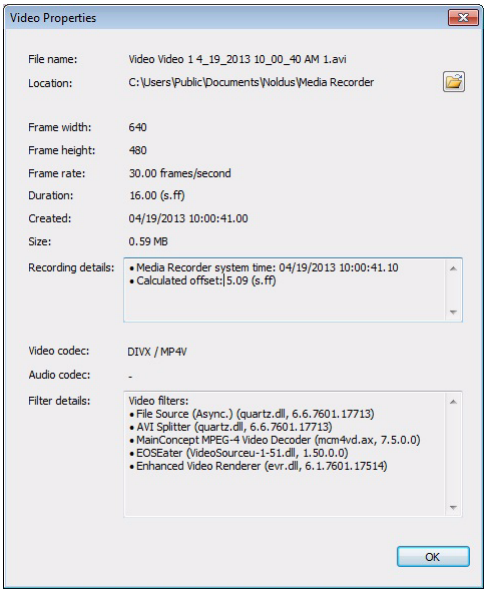
MANUAL RECORDING

If you start Media Recorder manually within 10 seconds after the observation starts, and import the videos into the observation, an

offset is automatically set. When you import the video in the observation, a message with the calculated offset is shown.

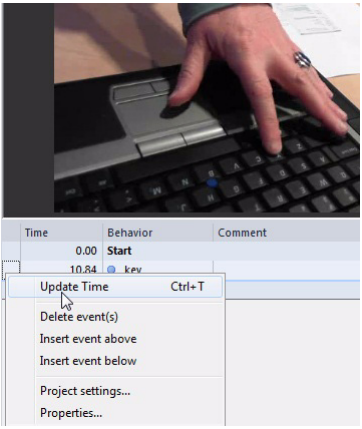


The offset is also shown next to **Recording details** in the **Video Properties** window in The Observer XT.



However, there can still be up to 1 second asynchronicity between the observation and the video files. Therefore you need to fine-tune the synchronization with an event that is recognizable in the videos. Scroll to the recognizable event in the video. Then right-click the event in the

Event Log and click **Update Time**. The video and observation are now properly synchronized.



11 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. 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.

12 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.

EDITING 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. The following settings can be changed to improve video quality or to increase the compression of the video file.

- **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.

UDP settings

UDP (User Datanet Protocol) is a way to send messages from one computer to another via an IP network. It is possible to send UDP messages whether Media Recorder is recording or not to another computer. This is useful to check at a remote location if Media Recorder is still functioning correctly. If not, the messages will stop to be sent to the remote computer.

By default this option is switched off. To switch it on, open the file current settings.mrs in XML Notepad and enter the following settings:

- **SendUDPmessages** — Change this from **false** to **true.**
- **Host** — Enter the computer name or the IP address of the computer where the messages should be sent to. The default **Localhost** is the computer on which Media Recorder runs.
- **Port** — Leave the port number at its default value **5556,** unless this port is in use by another program. Choose another port if port 5556 is already in use. This port must have the same number as the port used in the computer where the messages are sent to.

- **SecondsBetweenMessages** — Enter the time between the UDP messages. If you only want UDP messages when Media Recorder opens, and starts or stops recording, enter the value **0.**
- **Starttext** — The text sent when Media Recording is recording. The default text is **MR Recording**. Optionally change this text.
- **Stoptext** — The text sent when Media Recording is not recording. The default text is **MR Not Recording**. Optionally change this text.

13 Flow diagrams

The following diagrams show the way the audio and video streams are handled. Figure 5 shows the conversion of the audio and video streams into a video file by Media Recorder. Figure 6 shows the way the videos created with Media Recorder are decoded to play them back.

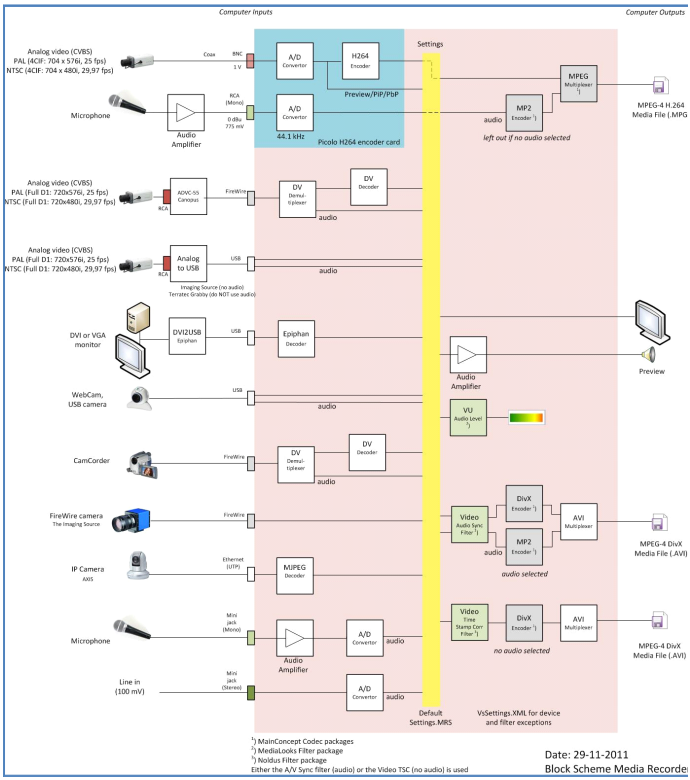


Figure 5 *Conversion of video and audio streams by Media Recorder.*

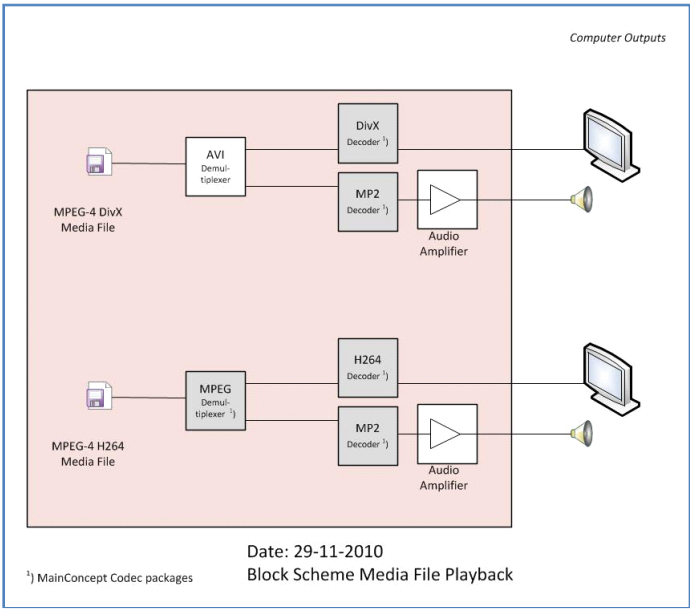


Figure 6 *Decoding the video files created with Media Recorder.*