APPLICATION NOTE

Interfacing Basler GigE and USB3 Vision Cameras with NeuroCheck

Applicable to Vision Interface Standard cameras and Windows operating systems only

Document Number: AW001390
Version: 02  Language: 000 (English)
Release Date: 11 November 2016
Software Version: NeuroCheck 6.1
Contacting Basler Support Worldwide

Europe, Middle East, Africa
Basler AG
An der Strusbek 60–62
22926 Ahrensburg
Germany
Tel. +49 4102 463 515
Fax +49 4102 463 599
support.europe@baslerweb.com

The Americas
Basler, Inc.
855 Springdale Drive, Suite 203
Exton, PA 19341
USA
Tel. +1 610 280 0171
Fax +1 610 280 7608
support.usa@baslerweb.com

Asia-Pacific
Basler Asia Pte. Ltd.
35 Marsiling Industrial Estate Road 3
#05–06
Singapore 739257
Tel. +65 6367 1355
Fax +65 6367 1255
support.asia@baslerweb.com

www.baslerweb.com

All material in this publication is subject to change without notice and is copyright Basler AG.
# Table of Contents

1 **Introduction**.............................................................................................................................. 2

2 **Steps to be Carried Out** .......................................................................................................... 2
   2.1 Checking Hardware Requirements.............................................................................. 2
   2.2 Checking Software Requirements............................................................................... 2
   2.3 Configuring Your Network Adapter........................................................................... 3
   2.4 Configuring Your GigE Vision Camera.......................................................................... 4
   2.5 Configuring Your USB3 Vision Camera .......................................................................... 5
   2.6 Connecting Your Camera Using the NeuroCheck Software ....................................... 6
   2.7 Acquiring Images Using NeuroCheck ....................................................................... 10

3 **Troubleshooting** .................................................................................................................... 10
   3.1 GigE Vision Cameras ................................................................................................ 10
       3.1.1 Firewall Settings....................................................................................... 10
       3.1.2 Network Interface Controller (NIC) Settings ............................................ 11
       3.1.3 Transport Layer Settings.......................................................................... 11
   3.2 USB3 Vision Cameras................................................................................................... 12

**Revision History** ...................................................................................................................... 13
1 Introduction

This document explains how to interface a Basler GigE or USB3 Vision camera with the NeuroCheck software using standard USB 3.0 ports or Gigabit Ethernet network adapters and the Basler pylon software.

2 Steps to be Carried Out

2.1 Checking Hardware Requirements

In addition to the Basler camera and its power supply, an Ethernet cable (Cat 6 or higher) is required.

For GigE cameras, your PC must be equipped with a Gigabit Ethernet network adapter card (also called Network Interface Controller or NIC). For USB 3.0 cameras, you need a USB 3.0 port onboard or provided by a USB 3.0 host controller. For all devices, you need a suitable cable.

We recommend using an Intel Pro 1000 family network adapter or an adapter with a comparable chipset. These adapters generally work well with the Basler performance driver. The performance driver lowers the CPU load required to handle the network traffic between the PC and the camera. It also has a more flexible packet resend request mechanism.

With other Ethernet adapters, a standard GigE Vision filter driver will be installed, and no automatic hardware-based optimization takes place. This may result in low camera performance and low frame rates. See Section 3 for recommendations.

For USB 3.0, please refer to the Setting up a Stable USB 3.0 Camera System document. The document can be downloaded from the Basler website.

2.2 Checking Software Requirements

To use the driver, the following software must be installed on your system:

- Basler pylon NeuroCheck Driver
- Basler pylon Runtime package
- NeuroCheck, version 6.1

The pylon Runtime package is included in the pylon NeuroCheck Driver ZIP file. The package must be installed separately.

Instead of the pylon Runtime package, you can also install the full pylon Camera Software Suite. It includes additional tools, e.g. the pylon USB Configurator.

You can download the pylon Camera Software Suite from the Basler website.
2.3 Configuring Your Network Adapter

By default, Basler GigE Vision cameras are configured to obtain their IP address automatically (no static IP address). We recommend that you also configure your network adapter to obtain IP addresses automatically. If there’s already another network adapter configured to obtain IP addresses automatically, consider configuring a statically addressed subnet.

1. Open the Network Connections window in the Windows Control Panel. For quick access, press the Windows + R keys, enter ncpa.cpl and press Enter.
2. Right click on the connection that is used for your cameras and select Properties from the context menu.
3. In the connection properties window, select Internet Protocol Version 4 (TCP/IPv4) and click the Properties button.
4. In the Internet Protocol Version 4 (TCP/IPv4) Properties window, you can configure automatic IP address allocation (see Figure 1) or manual input of the IP address (see Figure 2).

For more information, refer to the Installation and Setup Guide for Cameras Used with pylon for Windows document.
2.4 Configuring Your GigE Vision Camera

To configure your camera's IP address, you can use the Basler pylon IP Configurator. The tool is part of the pylon Runtime package which is included in the pylon NeuroCheck Driver ZIP file.

In the lower left area of the window, you can configure your camera's IP address. Choose between Static IP, DHCP or Auto IP (LLA) and enter the IP configuration if necessary.
2.5 Configuring Your USB3 Vision Camera

Typically, simply plugging in your camera should be sufficient for it to work. If problems occur, you can use the pylon USB Configurator to check for possible issues, e.g. incompatible ports, incorrect drivers, and insufficient bandwidth allocation.

The tool can be downloaded from the Basler website as part of the pylon Camera Software Suite. For more information, refer to the Installation and Setup Guide for Cameras Used with pylon for Windows document. The document can also be downloaded from the Basler website.
2.6 Connecting Your Camera Using the NeuroCheck Software

Before accessing a camera device with the NeuroCheck software, the camera must be configured as a new device in NeuroCheck:

1. Open NeuroCheck.
2. In the Intro window, click New. This creates a new check routine.
3. In the toolbar of the check routine window, click the Device Manager button:
4. In the Device Manager window, click New...
5. In the **Hardware Wizard** window, select **Digital camera** and click **Next**:

![Hardware Wizard](image1.png)

6. In the **Driver type** drop down list, select **Basler pylon camera driver** and click **Next**:

![Driver selection](image2.png)

7. In the list of available devices, select the devices that you want to use with the NeuroCheck software:

![Device selection](image3.png)

If the expected camera does not appear in the list, ensure that the camera is correctly
connected to your PC and properly configured. Then, press the **Rescan** button to repeat the device discovery.

8. Click **Finish**.
9. The selected devices are now listed in the **Device Manager** window.

10. Select a device in the tree view on the left and click **Properties**…

11. Change the camera parameters as required by your application.
In the Driver type drop down list (see Figure 6), you can click **About** to display version information and driver settings, e.g. for logging:

![Driver and Version Information](image)

**Figure 7: Driver and Version Information**
2.7 Acquiring Images Using NeuroCheck

In the toolbar of the check routine window, click the **Live View** button:

![Live View Button](image)

Figure 8: Live View Button

The **Live View** window opens, allowing you to grab images with your camera:

![Live View Window](image)

Figure 9: Live View Window

3 Troubleshooting

3.1 GigE Vision Cameras

3.1.1 Firewall Settings

Any application using the GigE Vision network protocol must be able to accept data from the camera on several different UDP ports. On systems equipped with a firewall, you should disable the firewall at least for the network adapter to which your camera is connected.

This especially applies to newer operating systems, as they handle firewall rules more strictly.

If you are using the Basler GigE Vision performance driver, the firewall setting is bypassed and has no effect on the camera stream channel (image grab) transmission.
3.1.2 Network Interface Controller (NIC) Settings

If image acquisition is unreliable, change, if applicable, the following settings of your network adapter card:

- **Packet size**: The maximum size of a data packet transmitted via Ethernet. By default, the packet size is set to 1500 bytes. This will be sufficient for most configurations. However, with more demanding camera models or inadequate hardware, it may be necessary to increase the packet size. This is possible because the GigE Vision stream can handle larger packet sizes than 1500 bytes. Basler recommends a significant increase of the packet size to up to 9014 bytes. This will reduce Ethernet overhead load and thus improve efficiency.

  - Increasing the packet size above 1500 bytes requires that you enable the so-called Jumbo Frames support on each involved network device including possible switches.

  - Whenever you increase the packet size for your network controller card, you must also adjust the packet size on camera side.

- **Ethernet flow control**: Basler recommends to enable Ethernet flow control if the network adapter supports it. This may decrease packet loss. If enabled, the streaming packet flow can pause and restart. This prevents the main memory from falling behind the packet processing.

- **Receive buffers**: The Ethernet adapter buffers received packets in so-called receive descriptors. If the number of descriptors for storing received camera stream packets is lower than actually required, the overflow will be lost. The number of buffers is essential to ensure high bandwidth stream transmission. The best choice is to increase the number of buffers to the maximum applicable value.

- **Interrupt moderation**: Controls how interrupts are received and handled. While normal traffic requires a lower rate of moderation, a typical GigE Vision stream demands more interrupt moderation. However, dealing with interrupt moderation affects the camera-to-network-adapter transmission as well as the CPU load. Try to find the optimum amount of moderation for your network configuration. Usually, the moderation can be set in predefined steps, e.g. Low, High, Extreme or Adaptive.

The parameters mentioned above can be found in the **Windows Network Connections** window. To access the window, right-click on your network adapter, select **Properties** and click **Configure**... 

3.1.3 Transport Layer Settings

- **Packet Size**: Whenever you increase the packet size for your network controller card (see Section 3.1.2), you must also adjust the packet size on camera side. Make sure the value for the camera doesn’t exceed the values set for other communication partner devices. Otherwise, streaming may fail due to blocked packets.

- **Inter-packet delay**: If your Ethernet adapter or other devices can’t handle the incoming packet rate, it is useful to increase the delay between packet transmissions. This may reduce the amount of dropped packets.
3.2 USB3 Vision Cameras

Throughput Limit: If image acquisition is unreliable, you can limit the bandwidth of the USB interface. This can be enabled by setting the Throughput Limit Mode parameter to On and entering a maximum value for the bandwidth.

If the pylon software is installed with USB support, the USB Configurator application can be used to display USB device information and to create a report file.
Revision History

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Date</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AW00139001000</td>
<td>25 July 2016</td>
<td>Initial release version of this document.</td>
</tr>
<tr>
<td>AW00139002000</td>
<td>11 Nov 2016</td>
<td>Aligned document with the documentation delivered with the pylon NeuroCheck Driver package.</td>
</tr>
</tbody>
</table>