

COGNEX®

Cognex Vision Software

GigE Vision Cameras User's Guide

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Cognex Software and GigE Vision Cameras

Cognex VisionPro and CVL software provide support for acquiring, processing, and displaying images from GigE Vision cameras. This document describes how to set the IP addresses of your GigE Vision hardware and perform other configuration tasks.

For information on using a GigE Vision camera with your Cognex vision software, see the VisionPro or CVL documentation. In addition, the Cognex technical support site may contain additional documentation about using GigE Vision for your machine vision application.

To use GigE Vision cameras with your Cognex software you must:

1. Install one or more GigE Vision network adapters and connect the cameras.
2. Install the manufacturer's drivers for the adapters and your Cognex software.

See the *VisionPro Quick Reference* or the *CVL Getting Started* for installation instructions for Cognex software.

3. Set the IP address for each GigE network adapter or each port of a multi-port network adapter.
4. Set the IP address for each GigE Vision camera.
5. Disable the Windows Firewall for the GigE Vision network adapter(s).
6. Adjust various system properties as necessary.

Refer to the following sections for details.

Software Security Requirements

In addition to the standard software and hardware requirements listed in your product documentation, your PC must include one of the following security mechanisms to run Cognex software:

- A Cognex frame grabber
- A Cognex security key (dongle)

Any of these devices can provide your Cognex software with required license information. See your Cognex sales representative for details.

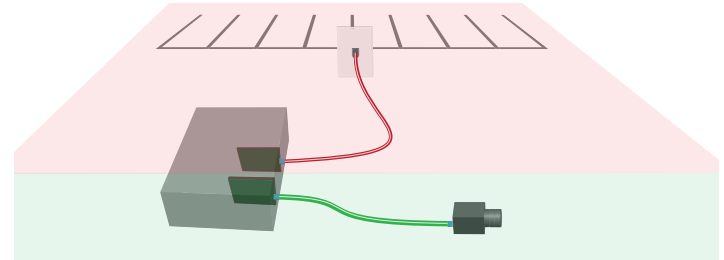
Install GigE Vision Network Adapters and Switches

Cognex recommends Gigabit Ethernet network adapters that use the PCI Express bus, and supports a variety of multi-port adapters and Ethernet switches. Any network adapters and switches you choose must support jumbo frames.

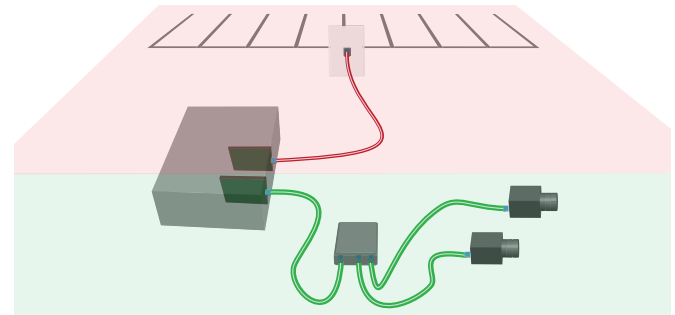
Contact your Cognex sales representative for assistance in choosing the best GigE Vision devices for your vision solution, and install the Gigabit Ethernet network device(s) according to the manufacturer's instructions.

Connect GigE Vision Cameras

For an application that uses only one camera, the GigE Vision camera network will consist only of a Gigabit Ethernet network adapter and the camera:



If you are using more than one camera, you can use a multi-port network adapter or a Gigabit Ethernet switch (shown):



When you are using a network switch, as in the previous figure, be aware the network bandwidth is shared among all the cameras connected to it.

Your PC may already have a network adapter that is used to connect your PC to a local area network or to the Internet. The network adapter(s) you use for image acquisition should be dedicated only for GigE Vision cameras and not connected to your local area network or to the Internet.

To avoid electromagnetic interference, any Ethernet cables you use must be shielded. Cognex strongly recommends Cat 6 or Cat 7 cables with S/STP shielding.

Install Your Cognex Vision Software

After installing the manufacturer's drivers for your GigE Vision network adapters, install your Cognex vision software (CVL or VisionPro) including the Cognex Drivers.

CVL and VisionPro installations include a utility for configuring your GigE Vision network adapter and camera, as well as the eBus Universal Pro driver that improves the performance of GigE Vision applications for most production environments.

Launch the GigE Vision Configuration Tool

Launch the Cognex GigE Vision Configuration Tool to assign IP addresses to each GigE Vision network adapter port and the camera connected to it.

- Make sure that your GigE camera is connected to the adapter and powered on before launching the GigE Vision Configuration Tool.
- Stop any applications that use CVL or VisionPro.
- If you are using Windows XP, you must use the GigE Vision Configuration Tool from an account with administrative privileges.

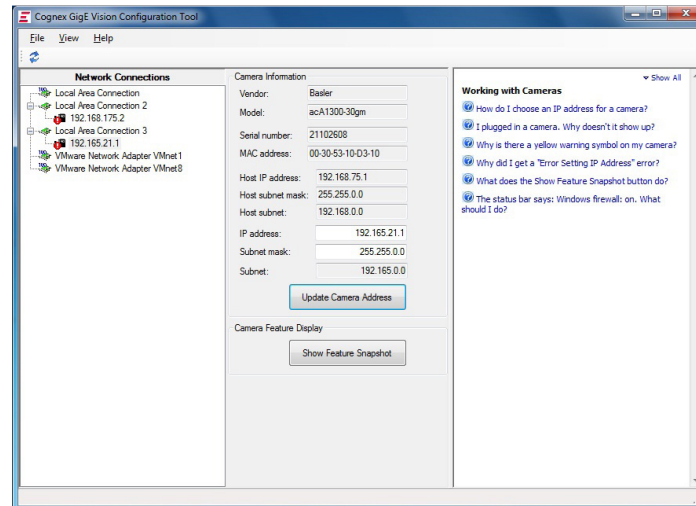
Start the GigE Vision Configuration Tool for CVL through the **Start** menu by choosing:

Cognex->CVL->Cognex Utilities->GigE Vision->Cognex GigE Vision Configuration Tool

For VisionPro:

Cognex->VisionPro->Utilities->GigE Vision Configuration Tool

The Cognex GigE Vision Configuration Tool displays all the network connections that correspond to the network adapters installed on your PC as well as the GigE Vision cameras connected to them:



The center panel displays information about the available network connections and cameras. In most environments at least one of your **Local Area Connections** is associated with the network connection of the PC. Check with your network administrator if you are not sure which one it is.

An interactive list of Questions and Answers appears on the right side of the utility to guide you in setting IP addresses and configuring other system properties.

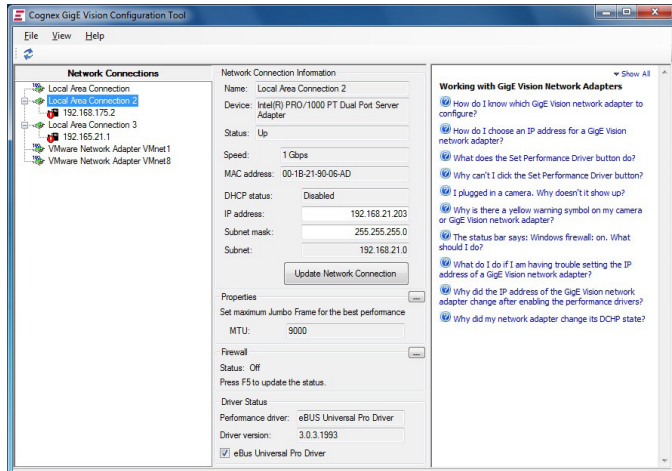
Set the Network Adapter IP Address

Each GigE Vision network adapter (or each port of a multi-port adapter) must have its own IP address on its own subnet. To set the IP address for a GigE Vision network adapter:

1. Select the **Local Area Connection** that corresponds to the adapter port connected to your GigE Vision camera(s).

Refer to the embedded Questions and Answers in the utility for guidance in selecting the correct **Local Area Connection**.

The center panel displays information about the selected adapter port:



2. Enter an **IP address** and **Subnet mask** for the adapter.
3. Click **Update Network Connection**.

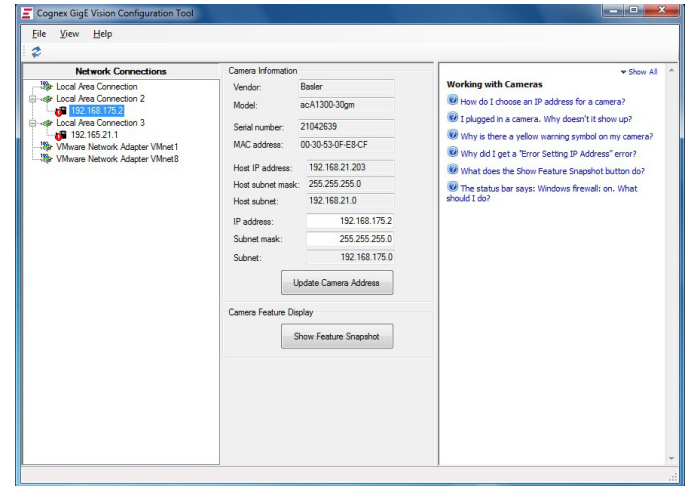
If you are not familiar with TCP/IP networking, Cognex recommends you use the following values:

Network Adapter	IP Address	Subnet Mask
1st adapter port	192.168.21.203	255.255.255.0
2nd adapter port	192.168.22.203	255.255.255.0
3rd adapter port	192.168.23.203	255.255.255.0

Set the Camera IP Address

Each camera must have an IP address in the same subnet as its network adapter. To set the IP address for a GigE Vision camera:

1. Select a camera on the left. The center panel displays information about the selected camera:



2. Enter an **IP Address** and a **Subnet mask** for the camera.

The IP address of the camera must be on the same subnet as its network adapter (or adapter port), which appears as the **Host IP address**. In addition, the subnet mask for the camera must be the same as the **Host subnet mask**.

For example, with a network adapter IP address of 192.168.21.203 and a subnet mask of 255.255.255.0, the camera connected to this network adapter can be numbered from 192.168.21.1 to 192.168.21.254, excluding 192.168.21.203 (the network adapter IP address).

3. Click **Update Camera Address**.

CVL and VisionPro order cameras according to their network addresses.

Be aware that you cannot successfully change the IP address of a camera while your vision application is running. You must stop the application and restart it after changing the IP address.

Disable the Windows Firewall

The GigE Vision Configuration Tool indicates the Windows Firewall status for the selected adapter port. You must disable the Windows Firewall for image acquisition.

If the GigE Vision Configuration Tool indicates that the Windows Firewall is on or not running for any selected adapter port, click the settings button, highlighted in the following figure, to open the Windows Control Panel:



Refer to the embedded Questions and Answers of the GigE Vision Configuration Tool for details on disabling the Windows Firewall for your particular operating system.

Be aware that the utility only detects the local setting for Windows Firewall, and not any settings determined by a group policy that overrides the local setting on this PC. In these situations the GigE Vision Configuration Tool can report that the Windows Firewall is on for the PC while the group policy safely disables it, allowing you to ignore the warning message.

Change System Properties

The GigE Vision Configuration Tool displays a warning when specific system properties such as the jumbo frame value are not set to the most desirable levels, as shown in the following figure. Click the settings button to open the Windows Control Panel.



Refer to the embedded Questions and Answers of the GigE Vision Configuration Tool for details on what system properties you should modify as necessary.

Disable Unused Network Clients

By default, both Windows XP and Windows 7 install and enable network clients that are not required for GigE Vision. By disabling these unused clients, you can improve GigE performance.

Windows XP

To disable unused clients under Windows XP:

1. Open the **Network Connections** applet of the Windows control panel.
2. Right-click the icon that corresponds to the Gigabit Ethernet adapter you are using for the GigE Vision network and choose **Properties**.

3. Select the **General** tab.

4. Ensure that only the following items are checked:

- **Internet Protocol (TCP/IP)**
- **Ethernet Bus Filter (eBus Universal)**

If no entry is present for **Ethernet Bus Filter**, then make sure that only **Internet Protocol (TCP/IP)** is checked.

5. Click **OK**.

Windows 7

To disable unused clients under Windows 7:

1. Open the **Control Panel->Network and Sharing Center**.
2. Click **Change Adapter Settings**.
3. Right-click on the icon that represents the Gigabit Ethernet adapter you are using for the GigE Vision network and choose **Properties**.

4. Ensure that only the following items are checked:

- **Internet Protocol Version 4 (TCP/IPv4)**
- **Ethernet Bus Filter (eBus Universal)**

If no entry is present for **Ethernet Bus Filter**, then make sure that only **Internet Protocol Version 4 (TCP/IPv4)** is checked.

5. Click **OK**.

Using GigE Vision Cameras

The manufacturer's camera documentation is the best source of information for your GigE Vision camera.

Video Formats

GigE Vision cameras you obtain through Cognex use one of the following Generic GigE Vision video formats:

- Mono, Mono10, Mono10 Packed, Mono12, Mono12 Packed, Mono14, or Mono16
- Bayer Color
- RGB8 Color
- YUV422 Packed

There are no camera-specific CCF files for GigE Vision cameras.

Supported GigE Vision Features

Cognex vision software supports the following GigE Vision features through the Cognex vision software API.

GigE Vision features supported in Cognex API

AcquisitionMode	AcquisitionStart	AcquisitionStop
AcquisitionFrameRateAbs		
BlackLevel	ExposureTime	Gain
OffsetX	OffsetY	PixelFormat
TriggerMode	Width	Height

See your camera documentation for a complete list of supported features. Always set features with a Cognex API if one exists.

If a Cognex API does not exist for a given feature, however, you can read and write directly using the VisionPro class

ICogGigEAccess or the CVL class **ccGigE VisionCamera**.

Adapters and Cables

Ensure that all components in your GigE Vision network conform to Gigabit Ethernet standards and that you are using Cat 6 or Cat 7 cables with S/STP shielding.

Sample Programs

Your Cognex software includes several sample programs that will help you learn how to use VisionPro or CVL with your GigE Vision camera.

You can find VisionPro sample programs in:

```
%VPRO_ROOT%\samples\Programming\Acquisition
```

If you are using QuickBuild scripting, you can find examples QuickBuild job files in the following directory:

```
%VPRO_ROOT%\samples\QuickBuild\
```

The QuickBuild job files that illustrate GigE Vision techniques are named beginning with `Script_GigE`.

You can find CVL sample programs in

```
%VISION_ROOT%\sample\cvl
```

Triggers, Strobes, and Bandwidth

In many cases your vision application will use strobes to illuminate the scene and freeze motion and triggers to control image acquisition. To ensure reliable operation, you may also be concerned about the bandwidth of your GigE Vision network.

In general the properties that control strobes, triggers, and bandwidth differ from manufacturer to manufacturer and from camera to camera, which makes it impossible to support them directly in the Cognex vision API.

The sample programs installed with your software include examples of how to use triggers, strobes, and how to control bandwidth on GigE Vision cameras.

You can use the timestamps included with each acquired image to detect missed images or missed triggers. You can learn more about timestamps from the *Using Timestamps with GigE Vision Cameras* topic in the VisionPro User's Guide. If you are using CVL, see the sample program `%CVL_ROOT%\sample\cvl\gige_timestamp.cpp`.

Third Party Considerations

If your camera included the manufacturer's drivers or software development kit, Cognex recommends that you not install them. If you have already installed such drivers, you should uninstall them before installing Cognex software.

All systems that use GigE Vision set the environment variable `%GENICAM_ROOT_V2_3%` and `%GENICAM_CACHE_V2_3%` to point to the location of the GenICam libraries. When you install Cognex vision software, the installer sets this environment variable to the location where it installs its libraries. If you have installed another vendor's GigE Vision product, it may have

already set the environment variable. In this case, the installer will warn you and ask you to confirm the change or to quit the installer.

Troubleshooting

- If you are experiencing difficulty setting the IP address of a GigE network adapter, consult the Release Information for your particular Cognex software for the latest news and information.
- In most cases, image corruption or failure to create acquisition FIFOs is the result of using incompatible Gigabit Ethernet adapters. The best way to correct or avoid such problems is to use a Cognex-recommended adapter.
- Some versions of Windows XP Service Pack 2 may crash or lock the PC. Microsoft offers a hotfix that corrects the issue. To learn more, see <http://support.microsoft.com/kb/921337>.
- During the installation of the eBus Universal Pro Driver on Windows 7, Windows may display a Security Alert dialog. To permanently accept Pleora's Microsoft Authenticode certificate, when the dialog appears, click **Pleora Technologies Inc > Install Certificate > Next**. Select **Place all certificates in the following store**. In the **Certificate store** field, type **Trusted Publishers**. Click **Next > Finish > OK**. The Security Alert dialog will no longer appear.
- Aborting the Cognex Driver installation can leave the network adapter in an invalid state.
- **Intel ProSet** software may not be compatible with the eBus Universal Pro Driver that Cognex uses. Cognex recommends that you do not install **Intel ProSet** software or other software that behaves similarly.
- The GigE Vision eBus Universal Pro Driver does not support power management. To turn off your PC, use **Shut down** rather than **Standby** or **Hibernate**.
- Due to an issue with the Pacific Instruments USB driver installer, the eBus Universal Pro Driver may be removed during the installation. To fix the issue, re-install the Cognex Drivers after installing the USB drivers.
- Click the refresh button or select **View->Refresh** to update the GigE Vision Configuration Tool with the latest IP addresses, which might not reflect the current settings after

you set the IP address of a GigE network adapter or GigE Vision camera.

- In some cases a VisionPro application that uses a dual-tap GigE Vision camera can exhibit a vertical line down the center of the image while the two halves appear unbalanced. Refer to the topic *Configuring a Dual-Tap GigE Vision Camera* in the VisionPro online documentation for details on how to balance the taps.
- Be aware that while jumbo frame support is enabled by default on most NETGEAR switches, it is disabled by default on the NETGEAR GS110TP Power over Ethernet switch. Refer to your GS110TP documentation for instructions on configuring jumbo frame support. Cognex recommends the maximum size available.

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