Pleora Technologies

iPORT

Quick Start Guide

SIMPLY CONNECT™

...high-performance imaging data and video over Ethernet

Version 3.0

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Contents

Getting started with the eBUS-Vision Package

The eBUS-Vision Package is a complete set of tools for configuring and controlling your iPORT IP Engine and camera. Coyote is a simple-yet-powerful program that lets you use your IP Engine to capture your first images. Then, as you familiarize yourself with the eBUS-Vision Package, you can create your own application with the SDKs.

The eBUS-Vision Package lets you go from concept to prototype to finished product!

In this section:

Getting started

To acquire your first images using the eBUS-Vision Package:

1. Insert your software CD in your PC and install the eBUS-Vision Package. During this step, you will install the NIC driver that best meets your needs.
2. Cable your camera, IP Engine, and PC together. See "Cabling your camera to your PC" on page 9.
3. If you're using Windows XP, configure the firewall. See "Configuring the Windows XP Firewall" on page 15.
4. Launch Coyote. See "Launching Coyote" on page 21.
5. Connect to your IP Engine. See "Connecting to your IP Engine" on page 27.
6. Acquire your first images. See "Acquiring images" on page 29.

Going further

Once you've acquired your first images, you can:

- Use the advanced configurations and controls in Coyote. See the *iPORT Coyote Software Guide*.
- Use your IP Engine to control external machinery. See the *iPORT Programmable Logic Controller Reference Guide*.
- Write your own program! See "Using the iPORT SDK" on page 27.

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Cabling your camera to your PC

When it comes to cabling, your iPORT IP Engine gives you a lot of flexibility. However, if you're cabling it for the first time, we recommend that you make a dedicated connection between your IP Engine and PC.

To cable your camera to your PC:

• Cable your system as described in either "Dedicated connection" on page 9 or "Dedicated connection with a second regular NIC" on page 9. Power cables aren't shown.

Dedicated connection

If you require a very high bandwidth connection to your IP Engine but don't require corporate network connectivity, use the configuration below.
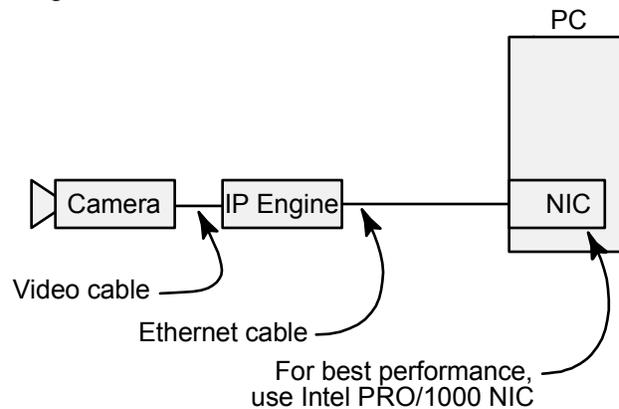
This configuration might be used for a standalone machine vision system. For best performance, cable your IP Engine to an Intel PRO/1000 NIC. The Intel PRO/1000 NIC is reliable and lets you use the efficient eBUS Optimal Driver.

Dedicated connection with a second regular NIC

If you intend to use your NIC as a dedicated connection to your camera, use the configuration below. In this configuration, you have a second NIC for corporate network connectivity.
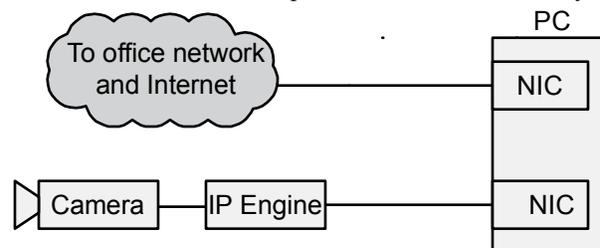
Switched connection (not recommended for first-time use)

If you intend to use a single NIC for both the connection to your camera and corporate network connectivity, use the configuration below.
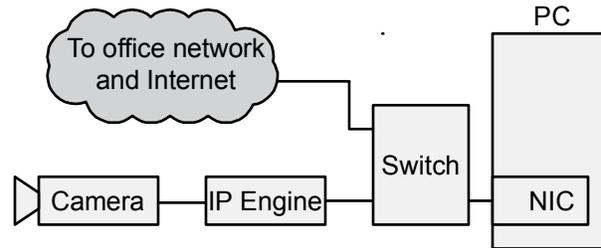
If you're setting up your IP Engine for the first time, we advise against using this configuration. Such an arrangement may cause the following problems:

- You may experience data loss, delay, or network slowdowns if the switch employs blocking architecture or insufficient packet forwarding capability.
- You may experience connectivity problems due to a switch that is nonstandard or improperly configured (jumbo frames not enabled).
- Switches that use a spanning tree algorithm often incur a significant delay (several minutes) when establishing a connection between a PC and the IP Engine. We recommend that you turn off spanning tree implementations on the switch (check with your network administrator).

Understanding drivers

In this section:

Quick pick

In general, the eBUS Universal Driver is a good, all-round choice.

Understanding drivers

A regular manufacturer's NIC driver receives Ethernet packets and passes them on to the Windows network stack. The network stack analyzes the headers from each layer.

However, for each packet, the network stack may have to perform hundreds of tests before routing the packet. The many decisions incur a heavy CPU usage penalty. The job of analyzing incoming packets overwhelms the CPU long before data throughput reaches the NIC's potential.
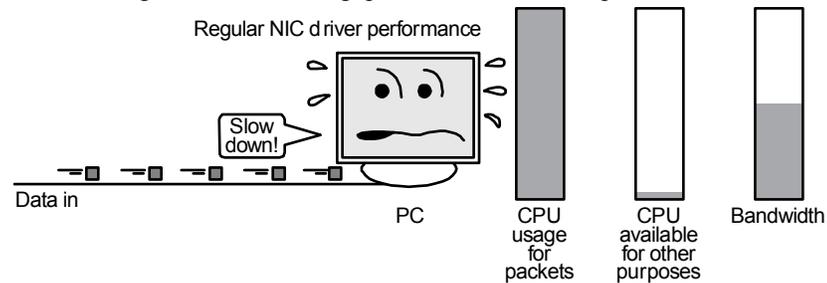
A Pleora driver tests only for data destined for your application. If so, the data bypasses the network stack to efficiently route data to your application. If not, the packet is sent to the Windows network stack. Since the great majority of the data will be for your high-bandwidth application, Pleora drivers dramatically reduce CPU usage. By eliminating the CPU usage bottleneck, data throughput is maximized and your CPU is free to perform other duties.
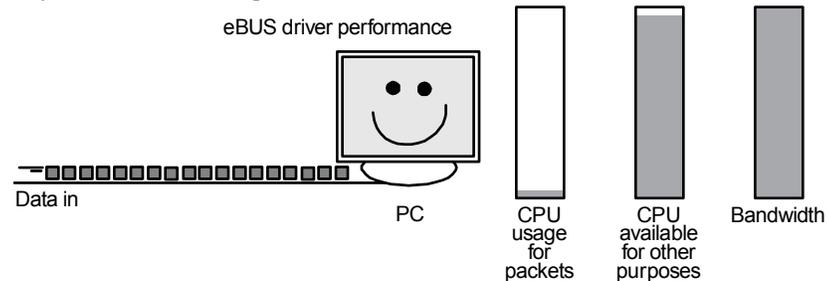
Choosing your driver

Pleora offers two eBUS drivers. If you're using an Intel PRO/1000 network card, we recommend the eBUS Optimal Driver. Otherwise, use the eBUS Universal Driver. If you've already got a project in development, you can use continue to use the iPORT High-Performance IP Device Driver.

Comparison of Pleora NIC drivers

Category	eBUS Optimal Driver	eBUS Universal Driver	iPORT High-Performance IP Device Driver[a]	Manufacturer's NIC driver
Efficiency	★★★★★	★★★★☆	★★★★★	★☆☆☆☆
Usage	High bandwidth, CPU-intensive applications	High bandwidth applications that can tolerate some sharing of CPU capacity	Existing projects requiring high-bandwidth	Temporary
Works with eBUS-PureGEV Package	✓	✓		
Works with eBUS-Vision Package	✓	✓	✓	✓
Limitations	Requires Intel PRO/1000 NIC and 825*xx* chips		Requires Intel PRO/1000 NIC and 825*xx* chips No support for corporate office connectivity (Internet)	
To upgrade...	Good choice – no change required	Good choice – no change required	Replace with eBUS Optimal Driver	Replace with eBUS Universal Driver

a. The iPORT High-Performance IP Device Driver isn't available with the eBUS-PureGEV Package. If you're migrating to the eBUS-PureGEV Package or wish to use the same driver for all your products, use an eBUS driver.

eBUS Optimal Driver

The eBUS Optimal Driver is our recommended driver for demanding applications. The driver is a purpose-built replacement for the regular driver that comes with your Intel PRO/1000 card or 825xx chip. Designed to maximize throughput and minimize CPU usage, it's ideal for high-bandwidth applications that need virtually all the CPU for other tasks. It also supports corporate network connectivity.

eBUS Universal Driver

The eBUS Universal Driver replaces the CPU-intensive Windows network stack. It works with almost any NIC because it works in conjunction with your NIC manufacturer's driver. The eBUS Universal Driver supports corporate network connectivity.

iPORT High-Performance IP Device Driver

If you're upgrading your iPORT SDK, already have an existing project under development, and you don't require a GigE Vision compliant connection, we recommend that you continue using the iPORT High-Performance IP Device Driver – it has a solid track record of field-proven reliability. In short, if your current system is working well, there's no need to change.

The iPORT High-Performance IP Device Driver is extremely efficient but disregards regular Internet traffic. As a result, it doesn't support corporate network connectivity.

If you wish to upgrade, consider the eBUS Optimal Driver.

Manufacturer's NIC driver

The manufacturer's NIC driver is the default driver that comes with your NIC.

Your manufacturer's NIC driver routes data through the Windows network stack. Though suitable for bandwidths of 100 Mb/s or less, higher bandwidths incur a significant CPU usage penalty. Bandwidth is limited when CPU usage reaches 100%. By devoting all its resources to packet routing, the PC is left with insufficient CPU resources for other tasks (such as processing or displaying images).

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Configuring the Windows XP Firewall

In its default configuration, the Windows XP Firewall may block certain network packets between your IP Engine and your image-acquisition program (e.g. Coyote, GEVPlayer, or your own program).

Follow the directions to ensure Windows XP Firewall lets your programs work as you expect. Finally, and only if you prefer, you can use the directions to disable the firewall completely.

If you're using Windows Vista, you don't need to make any changes.

To configure the Windows XP Firewall:

1. From the Windows Start menu, select **Start** > **Control Panel**.
   The Control Panel appears.
2. Open the **Windows Firewall**.
   If the firewall is set to **Off** (such as for closed systems), no further changes are required.
3. On the **General** tab, allow exceptions (*Uncheck* **Don't allow exceptions**).
4. Select the **Exceptions** tab.
5. Click **Add Program**.
   The **Add a Program** dialog appears.
6. Select your program (e.g. Coyote, GEVPlayer, or your own program) and click **OK**.
   The **Add a Program** dialog closes and your program appears in the **Programs and Services** field.
7. Click **OK** to close the **Windows Firewall** dialog.
   The Windows XP Firewall now allows your program to send and receive network packets.

Configuring your NIC

If you're in a typical networked office environment, your NIC will get its IP address from a DHCP server. However, if you're setting up for the first time, we recommend that you make a direct connection to your iPORT IP Engine. Without a DHCP server, Windows uses Zeroconf (also known as Autoconf or LLA fallback), but the fallback takes up to a minute every time you disconnect.

To connect faster, you can configure a static IP address. See "Dedicated connection (static IP address)" on page 17.

If you want to configure your NIC to get its IP address from a DHCP server, see "Multi-use connection (DHCP server)" on page 18.

Dedicated connection (static IP address)

This configuration assigns your NIC a static IP address.

To configure your NIC for a dedicated connection:

1. Make the following selections:
   In Windows XP: From the Windows Start menu, select **Start** > **Control Panel** > **Network Connections**.
   In Windows Vista: From the Windows Start menu, select **Start** > **Control Panel** > **Network and Sharing Center** > **Manage Network Connections**.

2. Right-click your **Local Area Connection** and select **Properties**.
   The **Local Area Connection Properties** dialog appears.
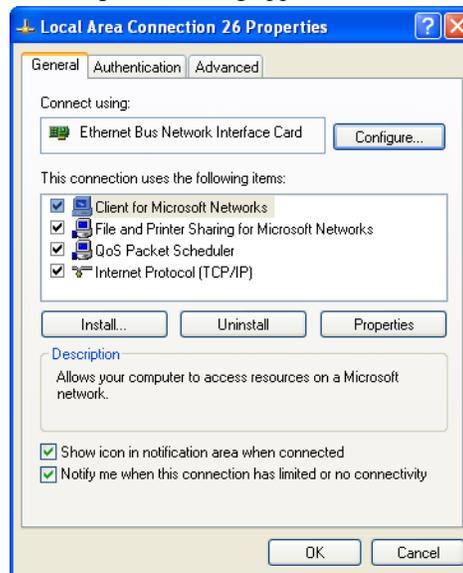
3. Make the following settings:

   ☑   **Client for Microsoft Networks**

   ☑   **File and Printer Sharing for Microsoft Networks**

   ☑   **QoS Packet Scheduler**

☑   **Internet Protocol (TCP/IP)**

☑   **Show icon in notification area when connected**

☑   **Notify me when this connection has limited or no connectivity**

4. Select **Internet Protocol (TCP/IP)** and click **Properties**.
   The **Internet Protocol (TCP/IP) Properties** dialog appears.
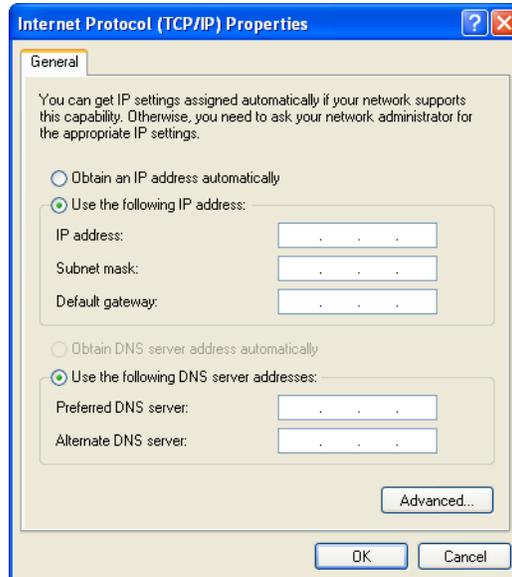
5. Enable **Use the following IP address** and make the following settings:

IP address	192.168.101.001
Subnet mask	255.255.255.0
Default gateway	leave blank

Ensure you're not conflicting with an existing IP address on another NIC. For multiple dedicated connections on the same host PC, increment the third IP address by one for each NIC (i.e. 101, 102, 103, etc.).

6. Click **OK** to close the **Internet Protocol (TCP/IP) Propertie**s dialog.
7. Click **Close** to close the **Local Area Connection Properties** dialog.
    Your NIC is now configured for a dedicated connection. When you cable your NIC to another NIC, Windows will recognize the connection without any delay.
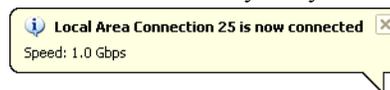
Multi-use connection (DHCP server)

If you're using your NIC for both your eBUS data and your regular office network connectivity, configure it as a multi-use connection. This configuration is generic and presumes your office network uses a DHCP server. For the exact settings for your network, consult with your company's IT department.

To configure your NIC for a multi-use connection:

1. From the Windows **Start** menu, select **Start** > **Control Panel**.
    The **Control Panel** dialog appears.
2. Double-click **Network Connections**.
    The **Network Connections** dialog appears.

3. Right-click your **Local Area Connection** and select **Properties**.
   The **Local Area Connection Properties** dialog appears.

4. Make the following settings:

   ✓ **Client for Microsoft Networks**

   ✓ **File and Printer Sharing for Microsoft Networks**

   ✓ **QoS Packet Scheduler**

   ✓ **Internet Protocol (TCP/IP)**

   ✓ **Show icon in notification are when connected**

   ✓ **Notify me when this connection has limited or no connectivity**

5. Select **Internet Protocol (TCP/IP)** and click **Properties**.
   The **Internet Protocol (TCP/IP) Properties** dialog appears.

6. Enable **Obtain an IP address automatically**.
7. Enable **Obtain DNS server address automatically**.
8. Click **OK** to close the **Internet Protocol (TCP/IP) Properties** dialog.
9. Click **Close** to close the **Local Area Connection Properties** dialog.
   Your NIC will now get its IP address from a DHCP server.

Connecting to your iPORT IP Engine

Coyote is a powerful and versatile camera interface application that lets you quickly configure your iPORT IP Engine and begin capturing camera images with your PC.

To connect to your iPORT IP Engine:

1. Start Coyote. See "Launching Coyote" on page 21.
2. Click **Detect** to find your iPORT IP Engine on your network. See "Detecting your iPORT IP Engine on your network" on page 21.
3. Click **Select** to select a camera. See "Selecting your camera" on page 23.
4. Click **Connect** to connect your PC to your IP Engine and camera.

Launching Coyote

Before launching Coyote, ensure that your camera and iPORT IP Engine are properly connected and powered. Ensure that your NIC has the appropriate driver. To learn more, see "Getting started with the eBUS-Vision Package" on page 7.

To launch Coyote:

- From the Windows Start menu, select **Start** > **All Programs** > **Pleora Technologies Inc** > **eBUS-Vision Package** > **Coyote Application**.
  The main page of the Coyote application appears.
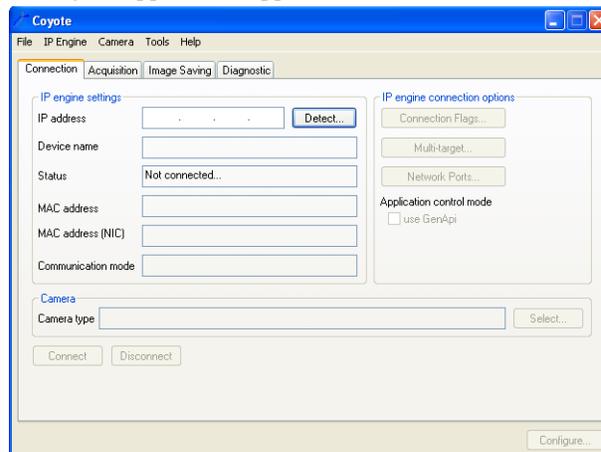

Detecting your iPORT IP Engine on your network

When you detect IP Engines, Coyote finds all the IP Engines it can, using all the NICs on your PC as well as any that are indirectly connected through switches.
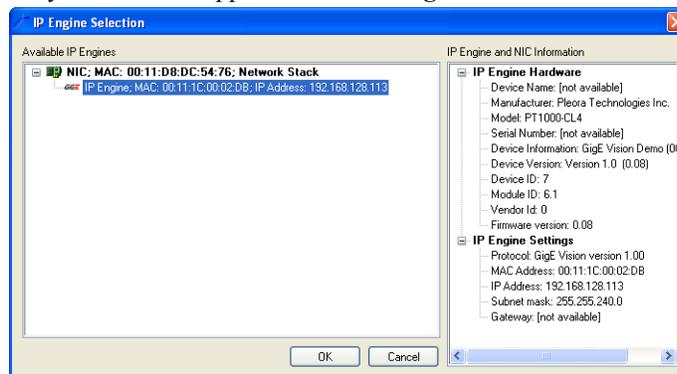
To detect your iPORT IP Engine:

1. Start Coyote. See "Launching Coyote" on page 21.

2. In the **IP Engine settings** pane, click **Detect**.
   The IP Engine selection dialog appears, listing the iPORT IP Engines that each NIC found. NICs connected to a switched network may find multiple IP Engines.
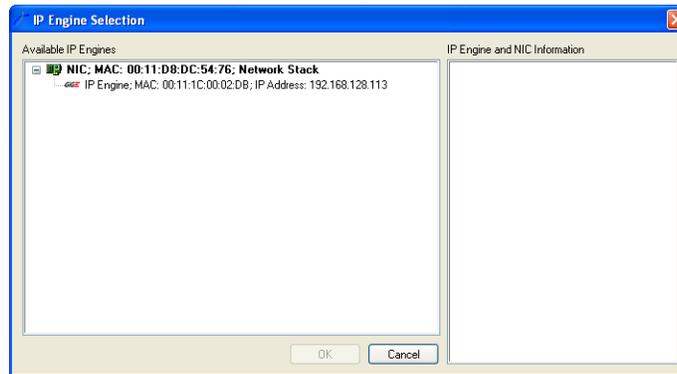
3. In the **Available IP Engines** pane, select your IP Engine.
   Information about your selection appears in the **IP Engine and NIC information** pane.

4. Click **OK**.
   The **Set IP Engine IP address** dialog appears.
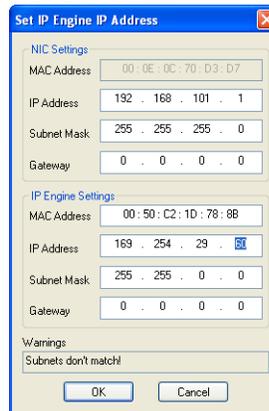
5. In the IP Engine settings pane, enter the **IP address** and **Subnet mask**. If you're connecting to your iPORT IP Engine through a network switch (not recommended for an initial connection), consult with your office IT department to ensure that your chosen IP address isn't used by another machine.
   The **Warnings** pane lets you know if values you enter are valid.

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6. Click **OK** to close the IP Engine selection dialog.
The updated information appears in the IP engine settings pane.
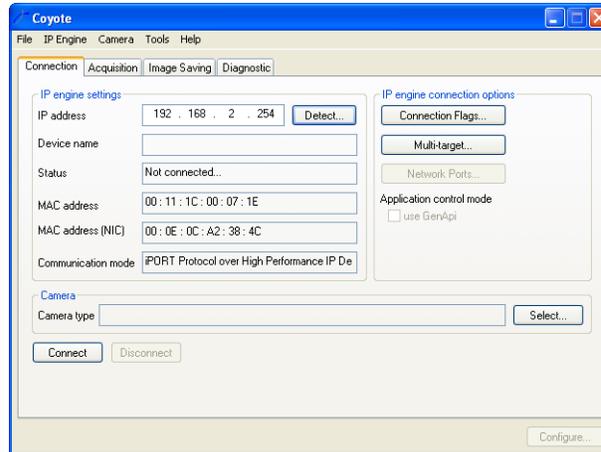
To speed the process of connecting to your iPORT IP Engine in the future, see ""Saving your settings" on page 24. Proceed to "Acquiring images with your camera" on page 25.

Selecting your camera

Coyote requires that you specify your camera when you connect to your IP Engine. However, in some cases, you may want to connect without a camera. For example, you may be trying to connect to the IP Engine for the first time or you might be following the tutorials described in the *iPORT Programmable Logic Controller Reference Guide*. When prompted, choose the first camera on the list (without that camera you obviously won't be able to acquire any images.)

For a better understanding of what the selections mean, see "Acquiring images with your camera" on page 25.

To select your camera:

1. From the main page of Coyote, click **Select**.
The **Select Camera** dialog appears with a list of all cameras supported by the IP Engine.

2. Select a camera and click **OK**. Only cameras supported by your IP Engine will appear.
The **Select Camera** dialog closes and your selection appears on the main page of Coyote.
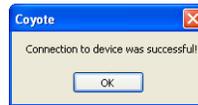
Testing your connection

When you connect to an IP Engine for the first time using an eBUS driver, Windows recognizes the IP Engine as new hardware.

To test your iPORT IP Engine:

• From Coyote's menu, select **IP Engine** > **Test connection**.
A dialog appears explaining the results of the test.

Saving your settings

To avoid reconfiguring every time you restart the program, Coyote lets you save your current settings as an XML file.

The XML file contains all the information for your iPORT connection, plus all the information for your camera connection (described in "Acquiring images with your camera" on page 25).

To save the settings for your iPORT IP Engine and camera:

1. From the main menu, select **File** > **Save**.
2. Type your file name and click **Save**.
Coyote saves your configuration.

To load the settings for your iPORT IP Engine and camera:

1. Launch Coyote. See "Launching Coyote" on page 21.
2. From the main menu, select **File** > **Open**.
3. Select your file and click Open.
Coyote loads your saved configuration. (If **File** > **Ignore connectivity information** is checked, you have to manually connect to your IP Engine before loading the settings. See the *iPORT Coyote Software Guide*.)

Acquiring images with your camera

Now that you've connected your iPORT IP Engine, you can connect to your camera and begin acquiring images. To acquire images successfully, you must ensure that Coyote, the IP Engine, and your camera have the same settings.

For full details for using and configuring Coyote, see the *iPORT Coyote Software Guide*.

To control your camera:
- If available, use the control software that came with your camera; or
- Send serial commands to your camera via the IP Engine. Use the **Port Communication** tab in Coyote's **Configuration** dialog.

To configure your IP Engine:
- Set the IP Engine to expect the images of the correct size and type for your camera. Use the **Grabber** and **Image** tabs in the Coyote's **Configuration** dialog.

To configure Coyote to receive images:
- Set Coyote to begin receiving images from your camera via the IP Engine. Use the **Acquisition** tab on Coyote's main page.

Common image capture troubles

In some cases, a working camera seems to not work due to a small issue.

Low light and bright light cameras

Some cameras are designed to work with very low light or very bright light. When exposed to the light levels typical of an office, the image may be completely white/black, giving the impression that no signal is being received.

When Coyote isn't receiving any image from the camera, it displays a gray screen.

To test for low/bright light cameras:
- If the image is white, cover the camera lens. If the image is dark, shine a bright light into the lens.
- If the camera required more or less light, the image will brighten or darken.

Incorrect image size

If Coyote expects to receive a larger image than your camera sends, Coyote may discard the image as bad.

To test for incorrect image size settings:
- Set the width and height settings to a value equal to or lower than your camera image size. In Coyote, click **Configure**, then select the **Image** tab.
- In the **Acquisition** tab, enable **Keep partial images**.
  If the expected image size was too large, partial or distorted images will appear.

Awaiting trigger

Some cameras won't send an image without receiving a trigger input.

To determine if your camera is awaiting a trigger signal:

- Consult your camera's documentation. Common terms include free-running, auto retrigger, continuous trigger, continuous acquisition, and rolling shutter.

  If your camera can be set in free-running mode, images will appear. Some cameras require a continuous enable signal to remain in free-running mode.

Using the iPORT SDK

Now that you've successfully connected to your iPORT IP Engine and acquired your first images, you're ready to begin developing your own application.

Included in your eBUS-Vision Package are sample applications, the *iPORT Concepts Guide*, and the *iPORT C++ SDK Reference Guide* (which contains directions for setting up your compiler and many example programs).

We encourage you to use the samples as a framework for creating your own application. As you become familiar with the SDK, we're confident that you'll find it a flexible tool for harnessing the power of your iPORT IP Engine.

To access the samples:

From the Windows Start menu, select **Start** > **All Programs** > **Pleora Technologies Inc** > **eBUS-Vision Package** > **Code Samples**.

Technical support

If you're having problems, the first place to look is in the documentation accompanying documentation. In particular, the *iPORT Concepts Guide* explains many topics that have been traditional trouble spots for our customers. The following are good sources of additional information and help. For best results, please read the entire section before deciding how to proceed.

Camera documentation

Cameras are complicated devices with many settings and features; many image-acquisition troubles are actually a misconfiguration or a working camera awaiting a trigger signal. For additional information, consult the documentation that accompanied your camera.

Pleora Resource Center

At the Resource Center, you can:
- download the latest software.
- view documentation for current and past releases.
- get presentations and application notes.
- get the latest news and information about our products.
- decide which of Pleora's products work best for you.

To visit the Resource Center:

1. Log in to **www.pleora.com**/ and click.
2. If you haven't logged in before, you'll be prompted to sign in.
   Accounts are typically validated within one business day.

Pleora Support Portal

At the Support Portal, you can:
- browse for solutions to problems other customers have encountered.
- log a support issue.

To visit the Support Portal:

1. Go to **www.pleora.com** and click **Help & Support**.
2. If you haven't logged in before, you'll be prompted to sign in.
   Accounts are typically validated within one business day.
3. If you can't find an existing solution in the knowledge base, post a question by clicking **Log a Case**. Provide as many specific details about your system and the nature of the issue as possible.

NOTE! Pleora's support email address has been deprecated and is no longer actively monitored. To contact support, use the support portal.

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