PLEORA TECHNOLOGIES INC.

# iPORT Analog-Pro IP Engine

## User Guide

Pleora Technologies

## Document Number

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# Table of Contents

# Chapter 1

## About this Guide

This chapter describes the purpose and scope of this guide and provides a list of complimentary guides.

The following topics are covered in this chapter:

# What this Guide Provides

This guide provides you with the information you need to connect the iPORT Analog-Pro IP engine. In this guide you can find a product overview, instructions for connecting the IP engine cables, installing the Pleora eBUS™ SDK, establishing an Ethernet connection, and performing general configuration tasks.

The last chapter of this guide provides Technical Support contact information for Pleora Technologies.

# Related Documents

The *iPORT Analog-Pro IP Engine User Guide* is complemented by the following guides:

- *GEVPlayer Quick Start Guide*
- *GEVPlayer User Guide*
- *vDisplay HDI-Pro IP Engine User Guide*

# Chapter 2

## About the iPORT Analog-Pro IP Engine

This chapter describes the IP engine, including the product variants and key features.

The following topics are covered in this chapter:

# The iPORT Analog-Pro IP Engine

The iPORT Analog-Pro IP engine allows for expansion of a GigE Vision video network to include high-value analog cameras. Compact and simple to integrate, the IP engine transmits high-quality video from analog cameras with low, predictable latency. Able to transmit video from up to two analog cameras simultaneously, this video transmitter is ideal for systems integrators looking to realize the benefits of networked video connectivity, while re-using high-value analog cameras.

The IP engine is compatible with the GigE Vision and GenICam™ standards for communication over a Gigabit Ethernet link, which increases interoperability between products from different manufacturers, while dramatically lowering system cost and complexity. With Gigabit Ethernet, cabling distances of up to 100 m can be achieved using standard CAT5/6 cabling; by incorporating common, off-the-shelf switches, cabling distances can be unlimited. Decreased cable size, increased flexibility, and a tighter cable bend radius are a few of the additional benefits gained when using Gigabit Ethernet for video transfer.

The iPORT Analog-Pro IP engine provides software-controlled general purpose inputs and outputs (GPIO), as well as two RS-232 ports to control external accessories, such as motorized wipers and pan/tilt housings. Able to transmit video at full resolution at up to 30 frames per second with low, consistent latency, the iPORT Analog-Pro IP engine is available as a compact, low-power OEM board set designed for use in a variety of housings. Compatible with the Pleora Technologies vDisplay™ HDI-Pro IP engines, as well as the Pleora Technologies feature-rich application toolkit, eBUS™ SDK, the iPORT Analog-Pro IP engine enables analog cameras to become part of a complete networked video connectivity solution.

## Product Formats: Board Set and Enclosed Unit

The iPORT Analog-Pro IP engine is available as either a compact board set designed for use in a variety of housings, or as an enclosed unit, in a compact and rugged case that can be used in a variety of applications as a stand-alone component within a simple point-to-point GigE network, or as part of a larger switched GigE network.

The following images show the board set and the enclosed iPORT Analog-Pro IP engine.

**iPORT Analog-Pro Board Set**


**Enclosed iPORT Analog-Pro IP Engine**

# Model Variants

The iPORT Analog-Pro IP engine is supplied in these variants and is equipped with these parts, as listed in the following table.

Table 1: Model Variants

| **iPORT Analog-Pro IP engine package variants*** | |
|---|---|
| **iPORT Analog-Pro OEM Kit** | **Quantity** |
| iPORT Analog-Pro Board Set | 1 |
| 12-pin circular connector for GPIO and serial communication | 1 |
| Adapter board for 12-pin circular to 20-pin FFC connector | 1 |
| 20-pin FFC cable | 1 |
| 2-pin power connector with open wires | 1 |

| **iPORT Analog-Pro Enclosed** | Quantity |
|---|---|
| iPORT Analog-Pro enclosed unit | 1 |

| **iPORT Analog-Pro Development Kit** | **Quantity** |
|---|---|
| iPORT Analog-Pro enclosed unit | 1 |
| Gigabit Ethernet network interface card (NIC) | 1 |
| Ethernet cable | 1 |
| Power supply with 12V power adapter | 1 |
| Pleora eBUS SDK CD (includes GEVPlayer sample application) | 1 |

*Before assembly, ensure that all components are included in the selected package.

# Feature Set

The iPORT Analog-Pro IP engine provides the features and functions listed in the following table.

Table 2: iPORT Analog-Pro IP Engine Feature Summary

| **Key features** |
|---|
| NTSC, PAL, CCIR, and RS-170 video signal support |
| Full resolution and frame rate for each supported video format |
| Two RS-232 serial ports to control external accessories |
| Software-controlled GPIO:<br>• 4 TTL (5V) general purpose inputs<br>• 3 TTL (5V) general purpose outputs |
| Compact form factor, low power consumption |
| OEM board set or enclosed unit |
| Low, consistent latency |
| Deinterlacing capability provides field insertion (weaving) and line duplication |
| Mono8 and YUV422Packed pixel formats |
| Compatible with Automated Imaging Association (AIA) GigE Vision specification 1.2; operates with GigE Vision and GenICam compatible applications |
| |
| **Environmental and Physical** |
| Storage temperature: -40° to 85°C |
| Operating temperature: 0° to 40°C (higher if using thermal pads between FPGA/PHY/DDR and chassis) |
| Dimensions:<br>• **OEM.** 105 mm X 52 mm X 42 mm<br>• **Enclosed.** 113 mm x 82 mm x 51 mm |

# Selected GenICam Features

In addition to the mandatory GenICam features for any compliant GigE Vision device, the iPORT Analog-Pro IP engine provides a number of additional features. Selected GenICam features are listed in the following table.

To view the description of a setting in GEVPlayer, click the feature. A brief description appears at the bottom of GEVPlayer.

Table 3: Selected GenICam Features

| Feature | Description |
|---|---|
| InputVideoFormat | Defines the video format accepted by the IP engine, either CompositeNTSC or CompositePAL.<br>Note: For RS-170 or CCIR, select CompositeNTSC or CompositePAL, respectively. |
| Width | Width of the image. |
| Height | Height of the image. |
| OffsetX | Horizontal image offset. |
| OffsetY | Vertical image offset. |
| PixelFormat | Available pixel formats are:<br>• Mono 8<br>• YUV422Packed |
| DeviceReset | Resets the IP engine to its power up state. |
| Interlaced | Configures the IP engine to decode the video coming from the camera as interlaced video. |
| Deinterlacing | Performs Line Duplication or Weaving. |

After you change the **InputVideoFormat**, **Interlaced**, and **Deinterlacing** features, you may need to adjust the **Width**, **Height**, or image offset (as the settings may now be invalid).

# Hardware Deinterlacing

Deinterlacing requires a receiver to buffer two fields and recombine them into full frames. The IP engine supports field-type combination deinterlacing for video captured from analog cameras. Two types of field-type deinterlacing are line insertion (weaving) and line duplication:

- **Weaving** is a method of deinterlacing that inserts the odd horizontal scanning lines of one field between the even horizontal scanning lines of another field. Artifacts associated with this video deinterlacing method are combing, and for this reason it is recommended for images with restricted motion.
- **Line duplication** is a method of deinterlacing that adds repeated horizontal lines of both the odd and even horizontal scanning fields. For example, lines 1 and 3 of one field are duplicated, and produce lines 2 and 4, respectively. There is a loss of vertical resolution associated with this deinterlacing method and it can introduce the video artifact referred to as “bobbing”. This method is suitable for images with larger amounts of motion.

# Chapter 3

# iPORT Analog-Pro IP Engine Connections

This chapter describes the IP engine connections. It also includes pinouts for the power, GPIO and serial connectors.

The following topics are covered in this chapter:

# Connector Locations

The following figure and table describe the IP engine connectors.

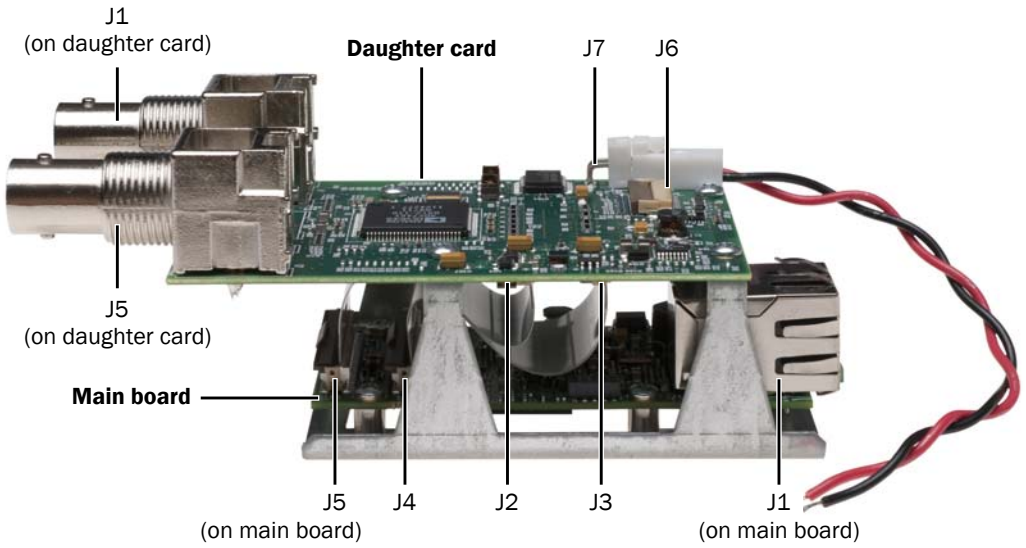



Table 4: IP Engine Connectors

| ID | Location | Type | Description |
|---|---|---|---|
| J1, J5 | Daughter card | BNC video connector | Accepts standard NTSC, PAL, CCIR, and RS-170 video. J1 corresponds to **Source1** and J5 corresponds to **Source2** in the GEVPlayer sample application. |
| J2, J3 | Daughter card | 50-pin connector | Allows communication between the daughter card and the main board. |
| J6 | Daughter card | 20-pin connector | Provides external signals, such as serial communication and GPIO, to the IP engine. |
| J7 | Daughter card | 2-pin connector | Receives 5V to 16V of unfiltered DC input.<br>The IP engine power circuitry is most efficient with 5V unfiltered DC input.<br>The IP engine's power consumption is approximately 4W (with both channels in use) temperature and input voltage dependent. |
| J4, J5 | Main board | 50-pin connector | Allows communication between the daughter card and the main board. |
| J1 | Main board | RJ-45 Ethernet connector | Interfaces the IP engine to Ethernet networks, as specified in IEEE 802.3.<br>The Ethernet interface can operate at 10, 100, or 1000 Mbps, and supports Internet Protocol Version 4 (IPv4). |

# Making GPIO and Serial Connections

The IP engine supports the connection of GPIO and serial devices, such as motorized wipers and pan/tilt housings. This section provides details on making GPIO and serial connections, mounting the 12-pin GPIO and serial connector to the backplate of a client-sourced enclosure, and provides connector pinouts.

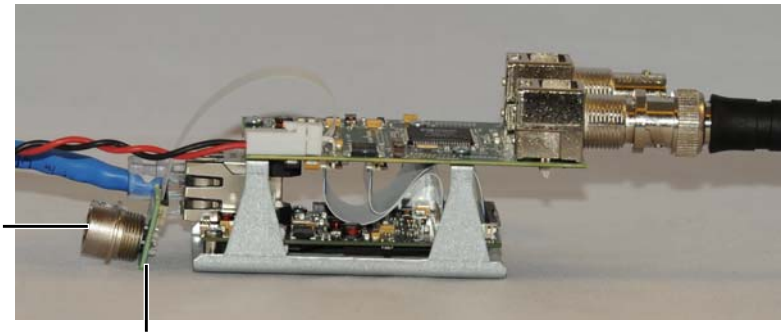
### To make GPIO and serial connections

- Connect the 20-pin FFC cable at J6 of the daughter card to the adapter board.

  The metallic side of the cable ends should be oriented towards the circuit board in both cases.

# Mounting the GPIO and Serial Connector to an Enclosure Backplate

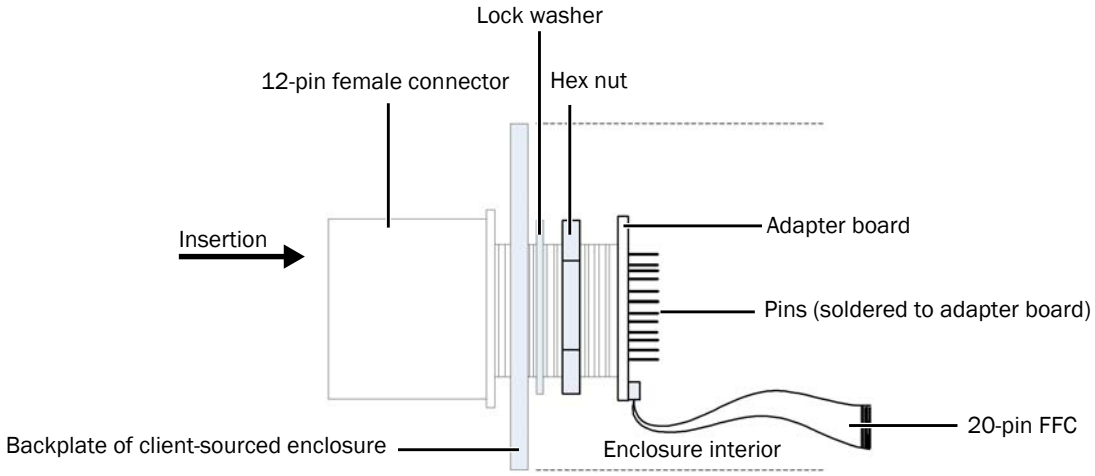
The removable 12-pin GPIO and serial circular connector and the corresponding adapter board are suitable for mounting to a client-sourced enclosure.




### To mount the GPIO and serial connector to an enclosure backplate

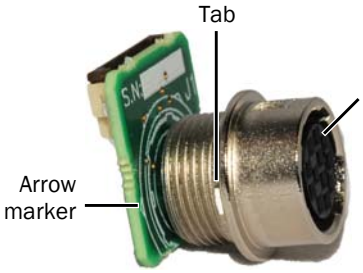
1. Insert the 12-pin connector through the external side of the backplate.
2. Secure with washer and hex nut.

3. Connect the adapter board (12 holes) to the base pins of the 12-pin connector through the internal side of the backplate.

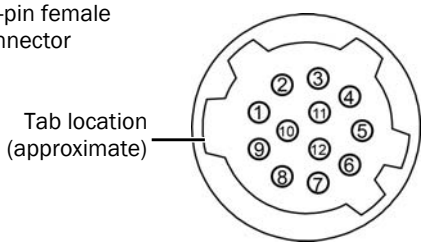



4. Assemble the 12-pin GPIO and serial circular connector to the adapter board by lining up the pins with the adapter board.

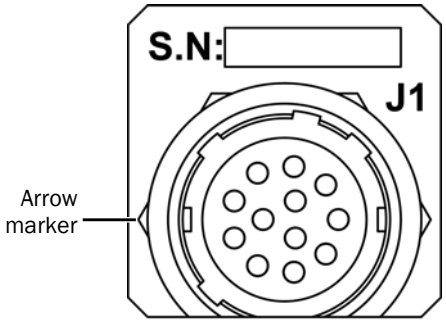
When oriented correctly, the tab on the 12-pin connector aligns with the arrow marker on the adapter board. The following figures show the pin locations, and also show the tab and arrow marker.




**Adapter board and 12-pin female connector (assembled)**




**12-pin female connector**




**Adapter board (unassembled)**

5. Solder the pins of the connector to the adapter board for a secure connection.

# GPIO and Serial Connector Pinouts — Adapter Board

The GPIO and serial pinout descriptions (J1, which is the 12-pin female connector, assembled to the adapter board) are listed in the following table.

The mating connector is a Hirose 12-pin connector, part number HR10A-10P-12P(73).

Table 5: GPIO and Serial Connector Pinout Descriptions (J1 on the Adapter Board)

| Pin | Name | Function | Type | Line | Notes |
|---|---|---|---|---|---|
| 1 | GPIO_OUT0 | TTL_OUT0 | GPIO output | Line4 | Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/-8 kV contact, +/-15 kV air discharge) |
| 2 | GPIO_IN1 | TTL_IN1 | GPIO input | Line1 | ESD information is the same as pin 1 |
| 3 | GPIO_OUT1 | TTL_OUT1 | GPIO output | Line5 | ESD information is the same as pin 1 |
| 4 | GPIO_IN2 | TTL_IN2 | GPIO input | Line2 | ESD information is the same as pin 1 |
| 5 | GND | Ground | Ground | n/a | Ferrite bead 0.2A, 600 Ohm @ 100 MHz to DGND of the daughter card |
| 6 | GPIO_OUT2 | TTL_OUT2 | GPIO output | Line6 | ESD information is the same as pin 1 |
| 7 | GPIO_IN3 | TTL_IN3 | GPIO input | Line3 | ESD information is the same as pin 1 |
| 8 | RS232_RX1 | RS-232 | Input | n/a | Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/-8 kV contact, +/-15 kV air discharge) |
| 9 | RS232_TX1 | RS-232 | Output | n/a | ESD information is the same as pin 8 |
| 10 | GPIO_IN0 | TTL_IN0 | GPIO input | Line0 | ESD information is the same as pin 1 |
| 11 | RS232_RX0 | RS-232 | Input | n/a | ESD information is the same as pin 8 |
| 12 | RS232_TX0 | RS-232 | Output | n/a | ESD information is the same as pin 8 |
| Shell | GND_CHASSIS | Chassis Ground | Ground | n/a | For the purpose of EMI prevention, provide good electrical contact between the connector shell and the enclosure box. |

The GPIO pins on the 12-pin connector are mapped to Line0 through Line6 of the DigitalIOControl\LineSelector feature in the **Device Control** dialog box in the GEVPlayer sample application. Line7 is mapped to GPIO_OUT3, which is only exposed on connector J6 (20-pin FFC connector). For information about configuring the IP engine with GEVPlayer, see “Connecting to the iPORT Analog-Pro IP Engine and Configuring General Settings” on page 27.

# GPIO and Serial Connector Pinouts — Daughter Card

The GPIO and serial pinout descriptions (J6 on the daughter card) are listed in the following table.

Table 6: GPIO and Serial Connector Pinout Descriptions (J6 on the Daughter Card)

| Pin | Name | Function | Type |
|---|---|---|---|
| 1 | RS232_TX1 | RS-232 | Output |
| 2 | RS232_TX1 | RS-232 | Output |
| 3 | RS232_TX1 | RS-232 | Output |
| 4 | RS232_RX1 | RS-232 | Input |
| 5 | RS232_RX1 | RS-232 | Input |
| 6 | RS232_RX1 | RS-232 | Input |
| 7 | GND | Ground | Ground |
| 8 | GPIO_IN0 | GPIO | Input |
| 9 | GPIO_OUT0 | GPIO | Output |
| 10 | GPIO_IN1 | GPIO | Input |
| 11 | GPIO_OUT1 | GPIO | Output |
| 12 | GPIO_IN2 | GPIO | Input |
| 13 | GPIO_OUT2 | GPIO | Output |
| 14 | GPIO_IN3 | GPIO | Input |
| 15 | GPIO_OUT3 | GPIO | Output |
| 16 | N/C | No connect | N/A |
| 17 | N/C | No connect | N/A |
| 18 | RS232_TX0 | RS-232 | Output |
| 19 | RS232_RX0 | RS-232 | Input |
| 20 | GND | Ground | Ground |

# Power Pinouts

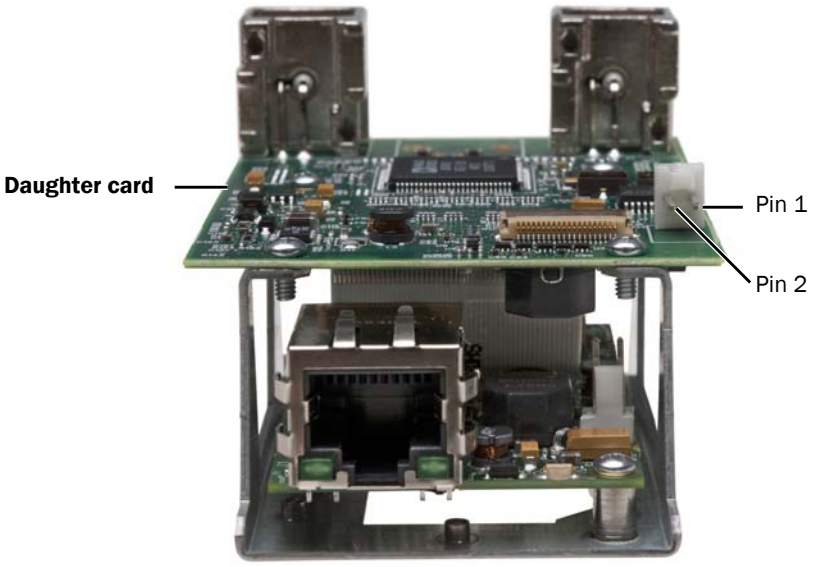
The power connector receives 5V to 16V of unfiltered DC input. The IP engine power circuitry is most efficient with 5V unfiltered DC input. The IP engine's power consumption is approximately 4W (with both channels in use), temperature and input voltage dependent.

## Power Pinouts — Board Set

The pinouts of the 2-pin header (J7 on the daughter card) are listed in the following table.

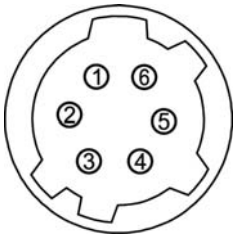
Table 7: Power Connector Pinout Descriptions — Board Set

| Pin | Name |
|---|---|
| 1 | PWR |
| 2 | RET |



## Power Pinouts — Enclosed IP Engine

The pinouts of the 6-pin female power connector are listed in the following table.




The mating connector is a Hirose 6-pin connector, part number HR10A-7P-6S(73).

Table 8: Power Connector Pinout Descriptions — Enclosed IP Engine

| Pin | Name |
|---|---|
| 1 | Vin 5V to 16V regulated |
| 2 | Vin 5V to 16V regulated |
| 3 | Vin 5V to 16V regulated |
| 4 | Ground |
| 5 | Ground |
| 6 | Ground |

# Chapter 4

## Status LEDs

The status LEDs indicate the operating status of the IP engine's network connection and firmware. The following figure and table describe the status LEDs.

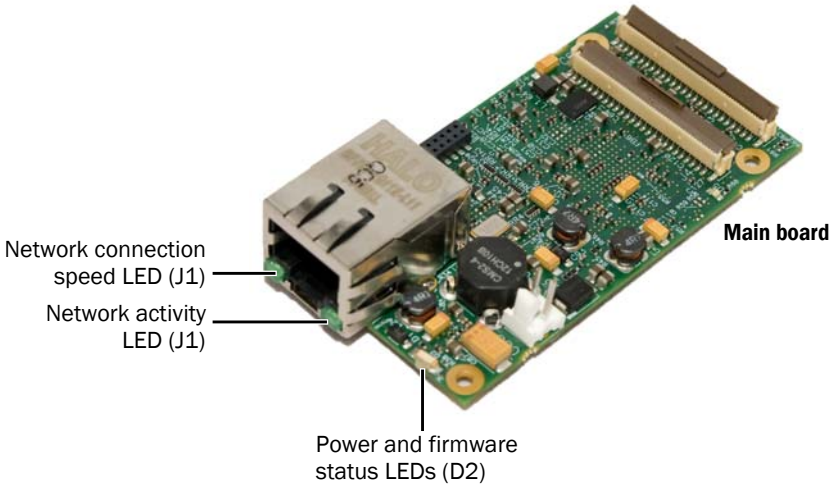


Table 9: Status LEDs

| LED | ID | Description |
|---|---|---|
| Network activity | J1 | **Green (solid).** Network connection.<br>**Green (blinking).** Data receive/transmit.<br>**Off.** No connection. |
| Network connection speed | J1 | **Green.** 1 Gbps connection.<br>**Off.** No connection, 10 Mbps connection, or 100 Mbps connection. |
| Power/FPGA | D2 | **Off.** No power.<br>**Green.** Power on.<br>**Orange.** Main firmware load is corrupted, or a slide switch is set incorrectly, forcing the IP engine to use the backup firmware load.* |

*For information about the slide switches that are used to specify the firmware load, see "Changing to the Backup Firmware Load" on page 50.

# Chapter 5

# Installing the SDK

This chapter describes how to install the eBUS SDK, and also provides information about installing the drivers that are best suited for your system.

Before you can configure and control your GigE Vision camera, you must install the eBUS SDK and driver.

The following topics are covered in this chapter:

# Installing the eBUS SDK

You can install the Pleora eBUS SDK on your computer to configure and control your GigE Vision camera. Consult the *GEVPlayer Quick Start Guide* or *GEVPlayer User Guide* for information about setting up and configuring your camera for connection to the IP engine.

The Pleora Technologies eBUS SDK contains an extensive library of sample applications, with source code, to create working applications for device configuration and control, image and data acquisition, and image display and diagnostics.

It is possible for you to configure the IP engine and GigE Vision compliant video sources using other GenICam compliant software, however, this guide provides you with the instructions you need to use the Pleora GEVPlayer application.

# Installing the Driver and Configuring the NIC

Before you can configure the IP engine, use the Driver Installation Tool (included with the eBUS SDK) to install the correct driver. Then, set up your NIC. There are three choices of driver, depending on the NIC installed in your computer:

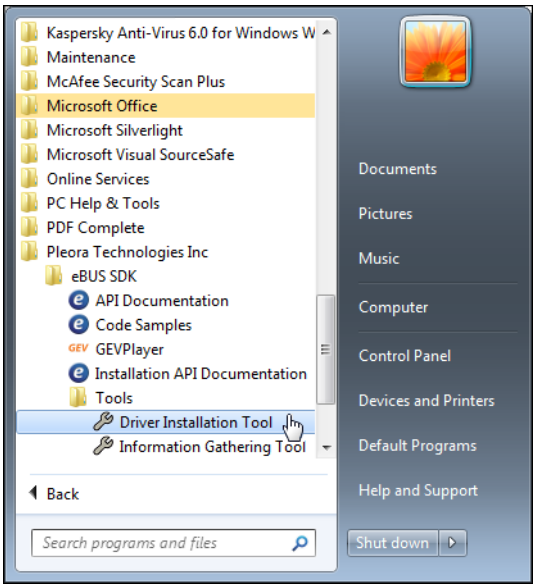
- Manufacturer Driver
- eBUS Universal Pro (for most NICs)
- eBUS Optimal (limited to particular Intel® NICs)

## To start the Driver Installation Tool and install an eBUS driver

1. Click **Start**, point to **All Programs > Pleora Technologies Inc > eBUS SDK > Tools**, right-click **Driver Installation Tool** and then click **Run as administrator**.

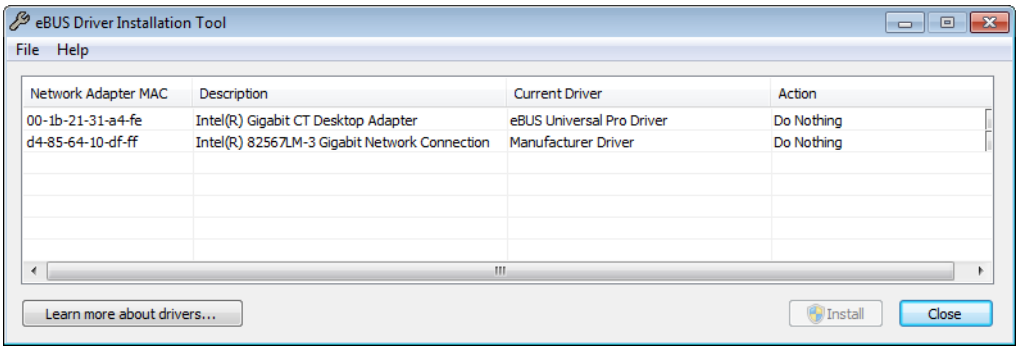
   To use the Driver Installation Tool, you must have administrator privileges for your computer. Consult Windows documentation for more information.

The instructions in this procedure are based on the Windows 7 operating system. The steps may vary depending on your computer's operating system.




2. Select a driver that is suitable for your computer's NIC. If you require additional information to help choose the most appropriate driver, click **Learn more about drivers**.

3. Click **Install** and follow the prompts to complete the driver installation.



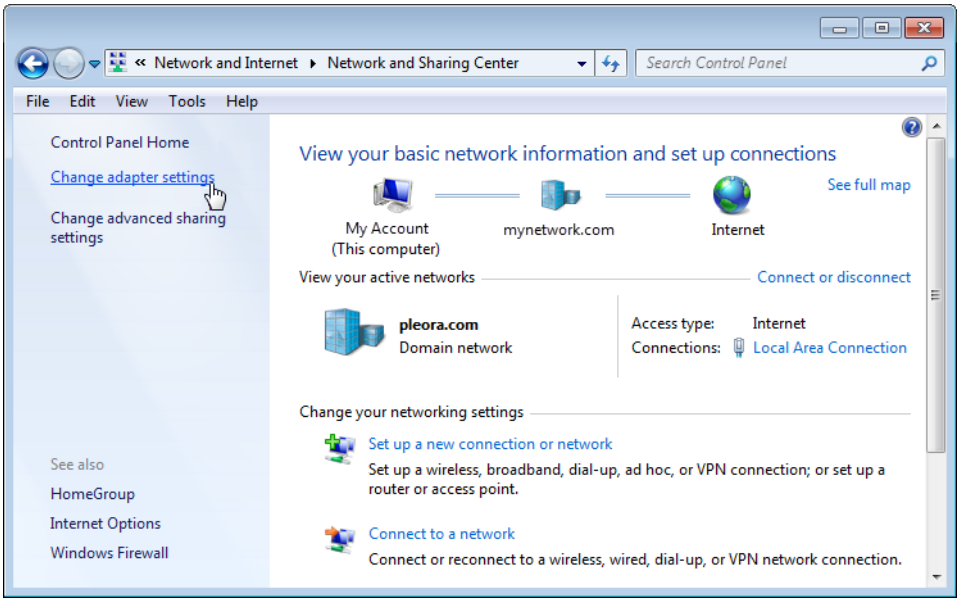

## To configure an IP address for the NIC

1. In the Windows Control Panel, click **Network and Internet**.

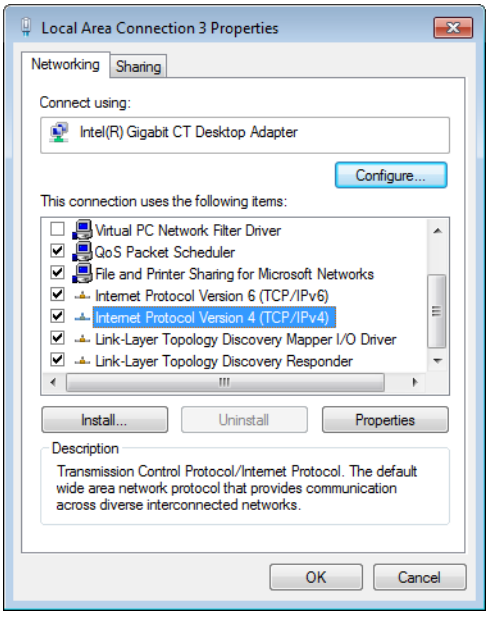
The instructions in this procedure are based on the Windows 7 operating system. The steps may vary depending on your computer's operating system.


2. Click **Network and Sharing Center**.

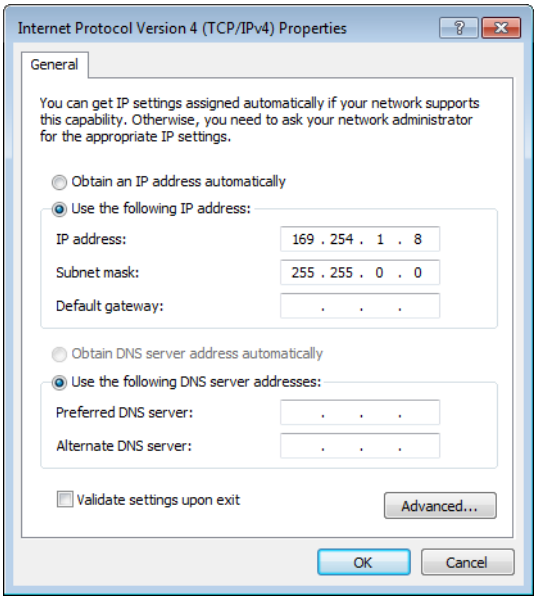
3. In the left-hand panel, click **Change adapter settings**.




4. Right-click the NIC and then click **Properties**.
5. Click **Internet Protocol Version 4 (TCP/IPv4)** and then click **Properties**.



6. Select **Obtain an IP address automatically** or **Use the following IP address** to give the NIC an IP address.

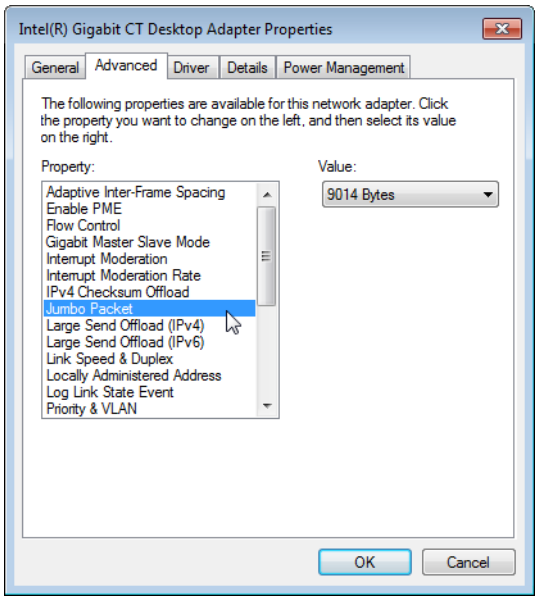



Static IP addressing allows for quicker detection and connection times on networks without a DHCP server, as the NIC does not have to negotiate a Link-Local Address (LLA).

7. Close the open dialog boxes to apply the changes.

8. Optionally, configure the NIC for jumbo packets. Using jumbo packets allows you to increase system performance. However, you must ensure your NIC and GigE switch (if applicable) support jumbo packets.

   To complete this task, right-click the NIC and click **Properties**. Then, click **Configure**. The exact configuration procedure, as well as the jumbo packet size limit, depends on the NIC.




While not mandatory, you may wish to disable the network firewall and anti-virus software to improve system performance. Additionally, certain default settings on the NIC may not be appropriate for receiving high-throughput image streams, such as the number of Rx Descriptors. Refer to the *Network Adapters Knowledge Base Technical Note*, available at the Pleora Technologies Support Center.

# Chapter 6

# Connecting to the iPORT Analog-Pro IP Engine and Configuring General Settings

After you have connected to the IP engine, you can provide it with a unique IP address on your network and configure the IP engine for either unicast or multicast.

You can also configure the buffers to reduce the likelihood of lost packets. And you can configure the image and deinterlacing settings based on your requirements.

The GEVPlayer application is documented in the *GEVPlayer Quick Start Guide* and the *GEVPlayer User Guide*. The *iPORT Analog-Pro IP Engine User Guide* provides you with the GEVPlayer instructions and overviews required to set up and configure the IP engine.

The following topics are covered in this chapter:

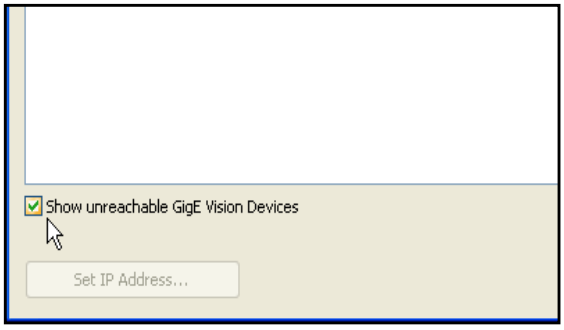
# Connecting the Ethernet Cables and Confirming Video Streaming

The IP engine can communicate with your computer using either a back-to-back connection or by connecting to a GigE switch. This section explains how to connect the IP engine to a GigE switch to confirm that video is streaming.

## To connect the Ethernet cables and confirm video streaming

1. Connect a CAT5e /CAT6 Ethernet cable to the RJ-45 Ethernet connector on your NIC. Then, connect the other end of the cable to the RJ-45 connector on your GigE switch.
2. Apply power.
3. Start GEVPlayer from the Windows **Start** menu.
4. Click **Select/Connect**.

   If the device does not appear in the list, click the **Show unreachable GigE Vision Devices** check box to show all devices.




5. In the **GEV Device Selection** dialog box, click the device, such as an IP engine.

If the IP address is not valid, a warning ( ) appears in the **GEV Device Selection** dialog box. Provide the device with an IP address, as outlined in "Providing the IP Engine with an IP Address" on page 30.

6. Click **OK**.

   GEVPlayer is now connected to the device.
7. Under **Acquisition Control**, click the source to which a camera is connected.
8. Click **Play** to stream live video.
9. After you confirm that video is streaming, close GEVPlayer.

If video does not stream, see the tips provided in "System Troubleshooting" on page 47.

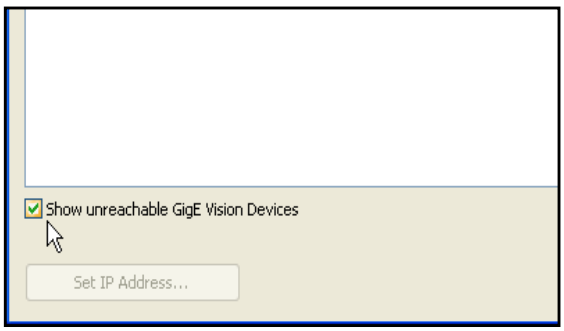
# Starting GEVPlayer and Connecting to a Device

You can start the GEVPlayer sample application (included with the eBUS SDK) to connect to a device. GEVPlayer lets you configure and control your GigE Vision camera.

## To start GEVPlayer and connect to a device

1. Start GEVPlayer from the Windows **Start** menu.
2. Click **Select/Connect**.

   If the device does not appear in the list, click the **Show unreachable GigE Vision Devices** check box to show all devices.




3. In the **GEV Device Selection** dialog box, click the device, such as an IP engine.

If the IP address is not valid, a warning ( ) appears in the **GEV Device Selection** dialog box. Provide the device with an IP address, as outlined in "Providing the IP Engine with an IP Address" on page 30.

4. Click **OK**.

   GEVPlayer is now connected to the device.

# Providing the IP Engine with an IP Address

The IP engine requires an IP address to communicate on a video network. This address must be on the same subnet as the computer that is performing the configuration and receiving the image stream.

### To provide the IP engine with an IP address

1. Start GEVPlayer.
2. Click **Select/Connect**.
3. Click the IP engine.
4. Click **Set IP Address**.
5. Provide the IP engine with a valid IP address and subnet mask. You can optionally provide a default gateway.

If you are using a unicast network configuration, the management entity/data receiver and the IP engine must be on the same subnet. The unicast network configuration is outlined in "Unicast Network Configuration" on page 31.

6. Click **OK** to close the **Set IP Address** dialog box.
7. Click **OK** to close the **GEV Device Selection** dialog box.

## Configuring an Automatic/Persistent IP Address

The Device Control dialog box allows you to configure a persistent IP address for the IP engine. Alternatively, the IP engine can be configured to automatically obtain an IP address using Dynamic Host Configuration Protocol (DHCP) or Link Local Addressing (LLA). The IP engine uses its persistent IP address first, but if this option is set to **False**, it can be configured to attempt to obtain an address from a DHCP server. If this fails, it will use LLA to find an available IP address. LLA cannot be disabled and is always set to **True**.

### To configure a persistent IP address

1. Start GEVPlayer and connect to the IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.
2. Click **Device control** in the **Parameters and Controls** section.
3. In the **TransportLayerControl** category, set the **GevCurrentIPConfigurationPersistentIP** feature to **True**.
4. Set the **GevPersistentIPAddress** feature to a valid IP address in the **GevPersistentIPAddress** field.
5. Set the **GevPersistentSubnetMask** feature to a valid subnet mask address.
6. Optionally, enter a valid default gateway in the **GevPersistentDefaultGateway** field.
7. Close the **Device Control** dialog box.
8. Power cycle the IP engine.

### To automatically configure an IP address

1. Start GEVPlayer and connect to the IP engine.

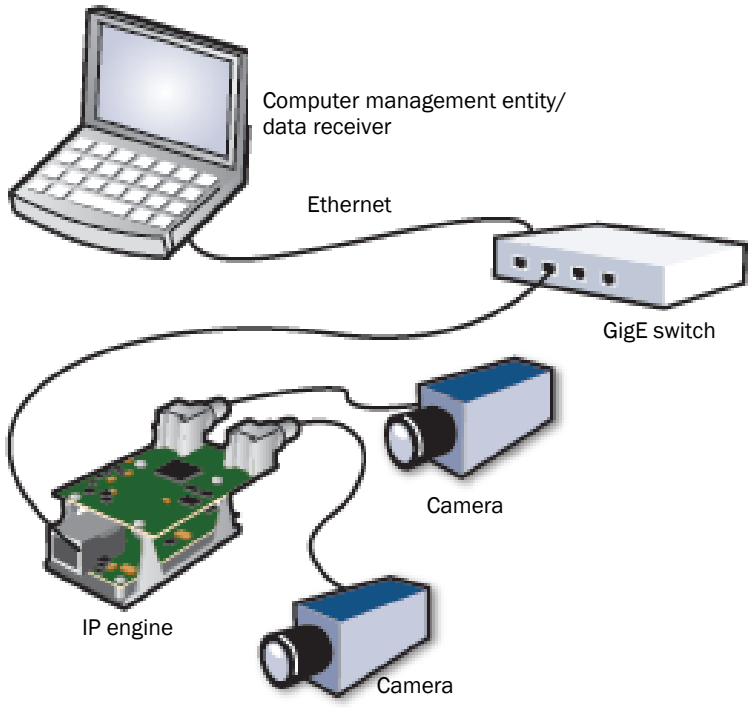
   For more information, see “To start GEVPlayer and connect to a device” on page 29.
2. Click **Device control** in the **Parameters and Controls** section.
3. In the **TransportLayerControl** category, set the **GevCurrentIPConfigurationPersistentIP** feature to **False**.
4. Set the **GevCurrentIPConfigurationLLA** and/or **GevCurrentIPConfigurationDHCP** values to **True**, depending on the type of automatic addressing you require.
5. Close the **Device Control** dialog box.
6. Power cycle the IP engine.

## Unicast Network Configuration

In a unicast configuration, an IP engine is connected to a GigE switch that sends a stream of video over Ethernet to the computer. Alternatively, the IP engine can be connected directly to the computer.

The computer is configured as both a data receiver and controller, and serves as a management entity for the IP engine.

Figure 1: Unicast Network Configuration



## Required Items — Unicast Network Configuration

You require the following components to set up a unicast network configuration:

- iPORT Analog-Pro IP engine
- 6-12V power supply
- CAT5e or CAT6 Ethernet cables (quantity: 1)
- GigE switch and an additional CAT5e or CAT6 Ethernet cable (optional)
- Desktop computer or laptop with eBUS SDK, version 2.0.0 (or later) installed
- Camera and cables

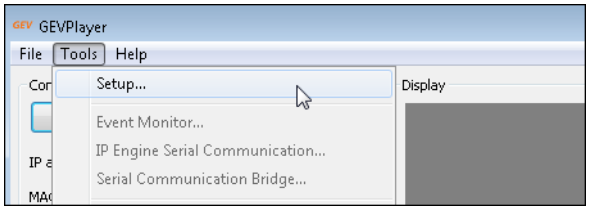
## IP Engine Configuration — Unicast Network Configuration

After you have connected and applied power to the hardware components, use GEVPlayer to configure the IP engine.

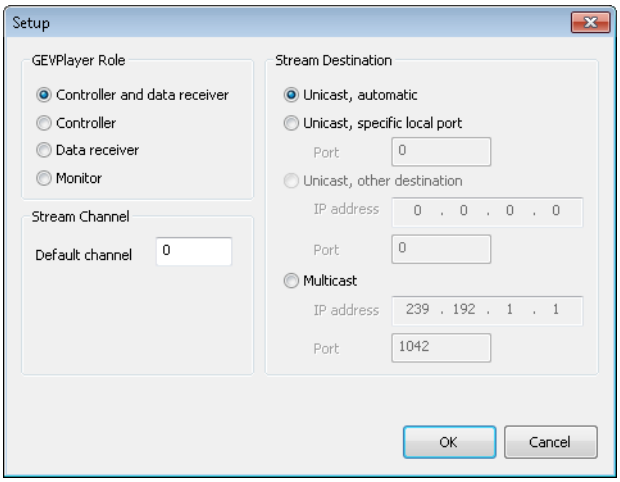
While the GEVPlayer **Device Control** dialog box includes a **SourceSelector**, which allows you to choose between the video inputs, this guide does not require you to select a source (as this guide only requires you to configure general IP engine settings that apply to both inputs). The **SourceSelector** feature (available in eBUS SDK version 2.2 and later) is discussed in the *GEVPlayer Quick Start Guide* and *GEVPlayer User Guide*.

### To configure the IP engine for a unicast network configuration

1. Start **GEVPlayer**.
2. Click **Tools > Setup**.



3. Under **GEVPlayer Role**, click **Controller and data receiver**.




4. Under **Stream Destination**, click **Unicast, automatic**.
5. Click **OK**.
6. Connect to the IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.
7. Click **Device control**.
8. Under **AnalogControl** > **InputVideoFormat**, ensure the correct **InputVideoFormat** is selected.

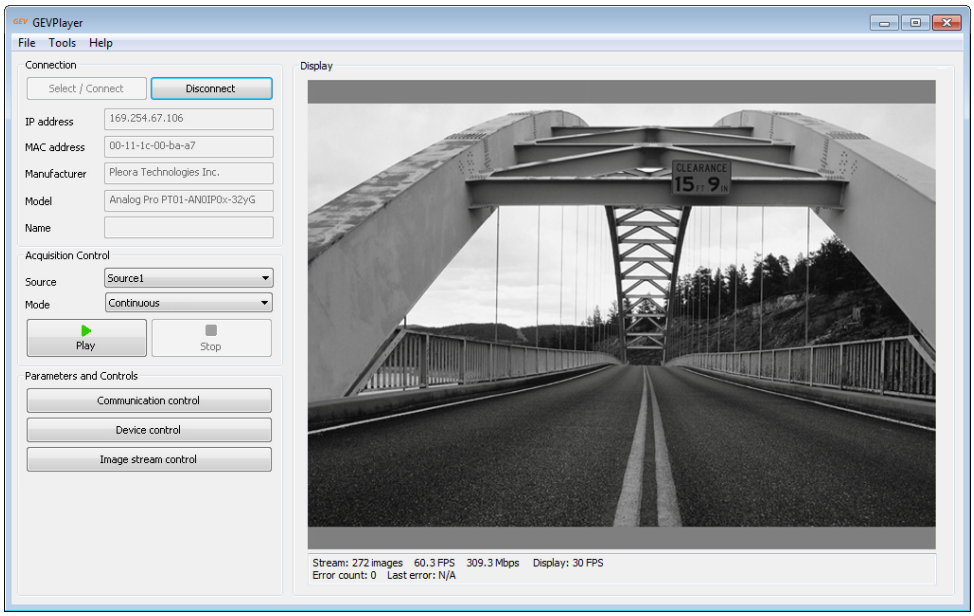
   For example, if the IP engine is connected to an NTSC camera, ensure that **CompositeNTSC** is selected and ensure that **ImageFormatControl** > **TestImageSelector** is set to **Off**. If a camera is not connected, ensure that **ImageFormatControl** > **TestImageSelector** is set to **On**, and optionally select a **TestPatternFormat**.

After you change the **InputVideoFormat** feature, you may need to adjust the **Width**, **Height**, or image offset (as the settings may now be invalid).

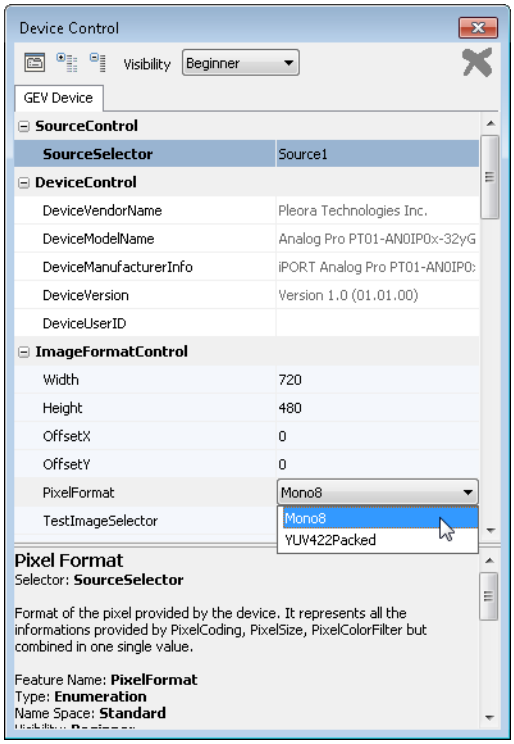
We recommend that you avoid using the test pattern when both video channels are in use and the IP engine is configured with the following settings: **PixelFormat: YUV422Packed** and **Deinterlacing: Line Duplication**.

9. Close the **Device Control** dialog box.
10. Under **Acquisition Control**, click the source to which the camera you want to view is connected.

**11.** Click **Play** to view live video.



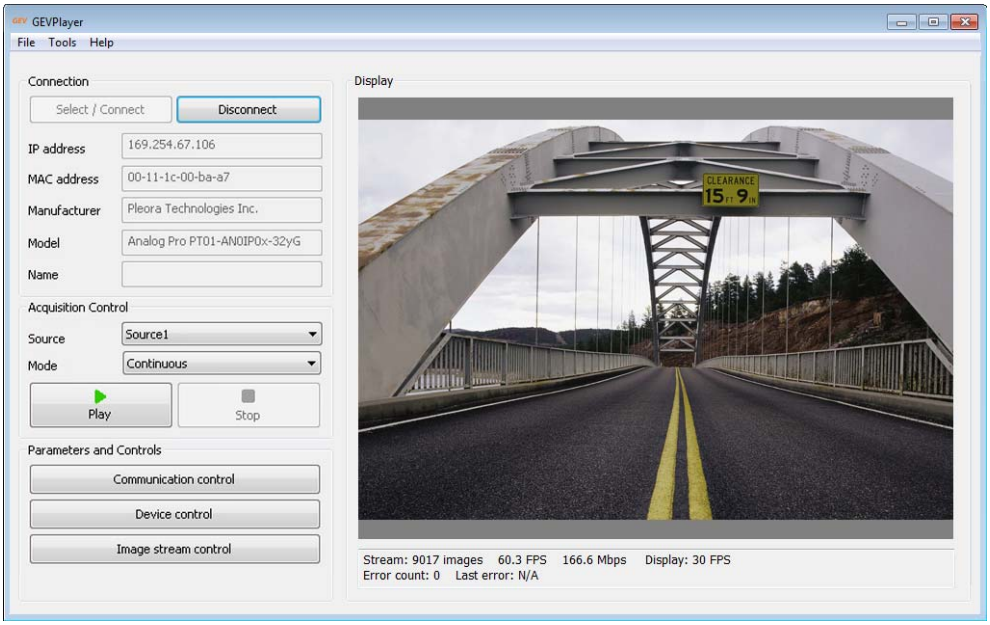

**12.** To change the video from black and white to color (optional), click the **Stop** button to stop playback and then click **Device control**. In the **ImageFormatControl** category, set the **PixelFormat** feature to **YUV422Packed** (by default the **PixelFormat** is set to **Mono8**).




**13.** Close the **Device Control** dialog box.

**14.** Under **Acquisition Control**, click the source to which the camera you want to view is connected.

**15.** Click **Play** to see the video in color.

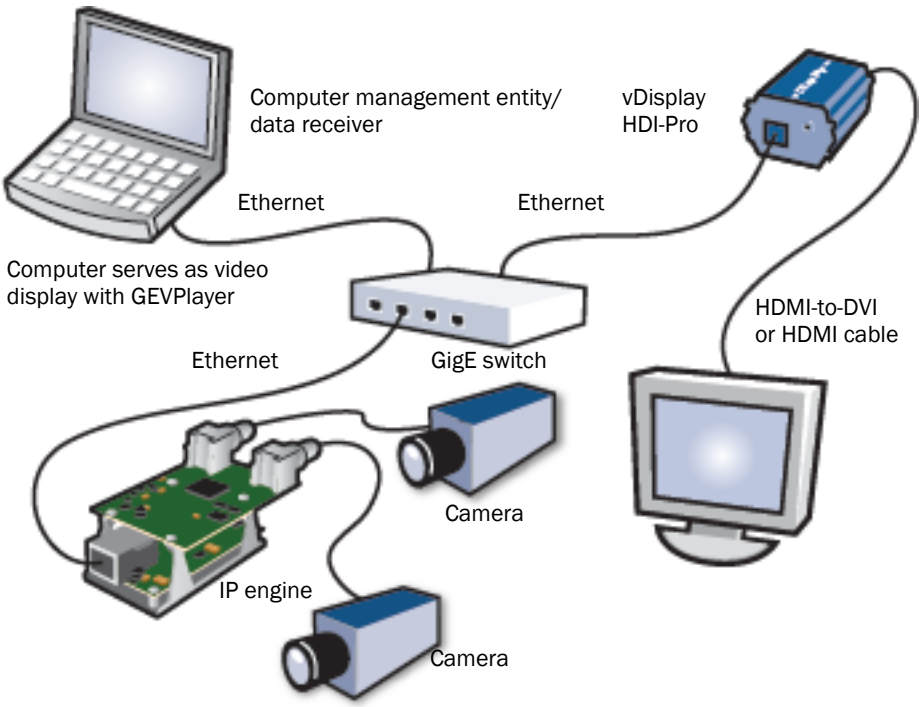


# Multicast Network Configuration

In a multicast network configuration, the iPORT Analog-Pro IP engine is connected to a GigE switch, and sends a stream of video over Ethernet simultaneously to both a computer and to a vDisplay HDI-Pro IP engine. Then, the vDisplay HDI-Pro IP engine converts it to video for display on a monitor.

You can configure the iPORT Analog-Pro IP engine to transmit video simultaneously to both a computer running GEVPlayer and another receiver, such as a vDisplay HDI-Pro IP engine.

Figure 2: Multicast Network Configuration



## Required Items — Multicast Network Configuration

You require the following components to set up a multicast network configuration:

- iPORT Analog-Pro IP engine
- 6-12V power supply
- vDisplay HDI-Pro IP engine and corresponding power supply
- Compatible display monitor
- Cable to connect the vDisplay HDI-Pro IP engine to the display monitor
- CAT5e or CAT6 Ethernet cables (quantity: 3)
- GigE switch (IGMP v2-compatible)
- Desktop computer or laptop with the eBUS SDK, version 2.0.0 (or later) installed
- Camera and cables

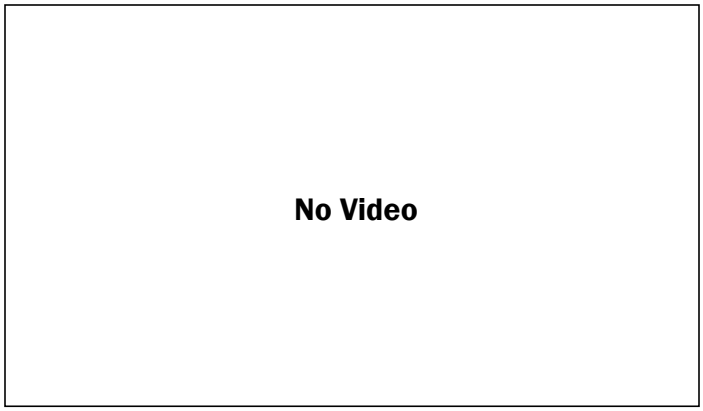
## Connecting the Hardware and Power

The following procedure explains how to connect the power, network, and data cables to the vDisplay HDI-Pro IP engine and Analog-Pro IP engine.

### To connect the network and data cables to the vDisplay HDI-Pro IP engine and Analog-Pro IP engine and apply power

1. Connect one end of a CAT5e/CAT6 cable to the vDisplay HDI-Pro IP engine Ethernet connector. Attach the other end to an available port on the GigE switch.
2. Connect one end of a CAT5e/CAT6 cable to the iPORT Analog-Pro IP engine Ethernet connector. Attach the other end to an available port on the GigE switch.
3. Connect one end of a CAT5e/CAT6 cable to the Ethernet connector on your computer's NIC. Attach the other end to an available port on the GigE switch.
4. Attach one end of the video cable to the display monitor. Attach the other end to the HDI connector on the vDisplay HDI-Pro IP engine.
5. Apply power to the devices.

   The message **No Video** appears on the display monitor.



## Configuring the vDisplay HDI-Pro IP Engine and iPORT Analog-Pro IP Engine for a Multicast Network Configuration

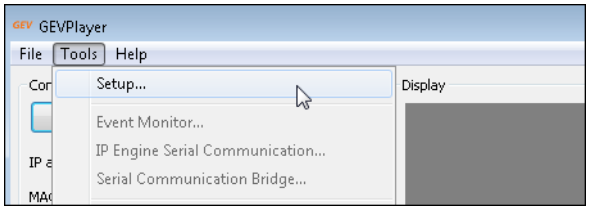
After you have connected and applied power to the hardware components, use GEVPlayer to configure the vDisplay HDI-Pro IP engine and iPORT Analog-Pro IP engine for multicast configuration. You may want to launch two instances of GEVPlayer to perform both configurations. Begin by configuring the vDisplay HDI-Pro IP engine.

The vDisplay HDI-Pro IP engine application is documented in the *vDisplay HDI-Pro IP Engine User Guide*. The *iPORT Analog-Pro IP Engine User Guide* provides you with the vDisplay HDI-Pro IP engine instructions and overviews required to set up and configure the vDisplay HDI-Pro IP engine for a multicast configuration.

While the GEVPlayer **Device Control** dialog box includes a **SourceSelector**, which allows you to choose between the video inputs, this guide does not require you to select a source (as this guide only requires you to configure general IP engine settings that apply to both inputs). The **SourceSelector** feature (available in eBUS SDK version 2.2 and later) is discussed in the *GEVPlayer Quick Start Guide* and *GEVPlayer User Guide*.

### To configure the vDisplay HDI-Pro IP engine for a multicast network configuration

1. Start **GEVPlayer**.
2. Click **Tools** > **Setup**.



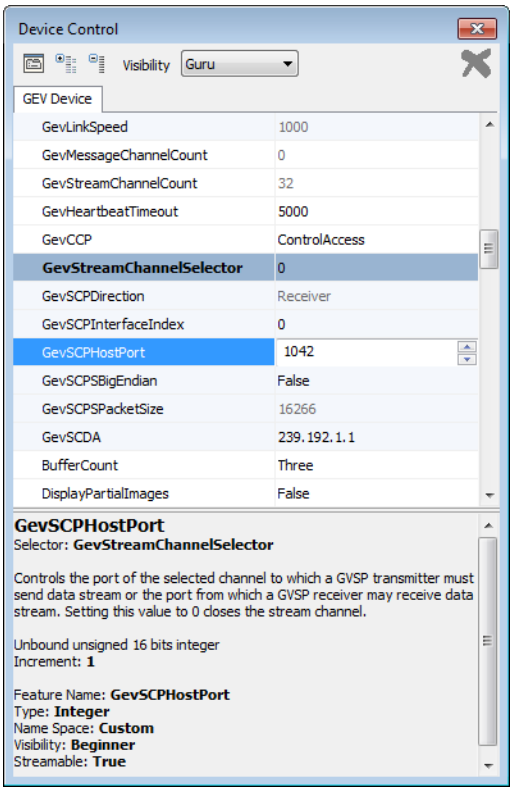

3. Under **GEVPlayer Role**, click **Controller**.

   You do not need to specify the **Stream Destination**, as the stream destination is not applicable to a video receiver.

4. Connect to the vDisplay HDI-Pro IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.

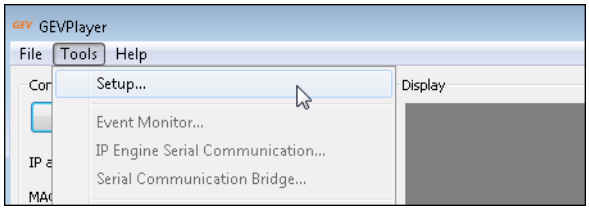
5. Click **Device control**.
6. In the **TransportLayerControl** category, set **GevSCPHostPort** to a streaming channel port (for example, 1042).



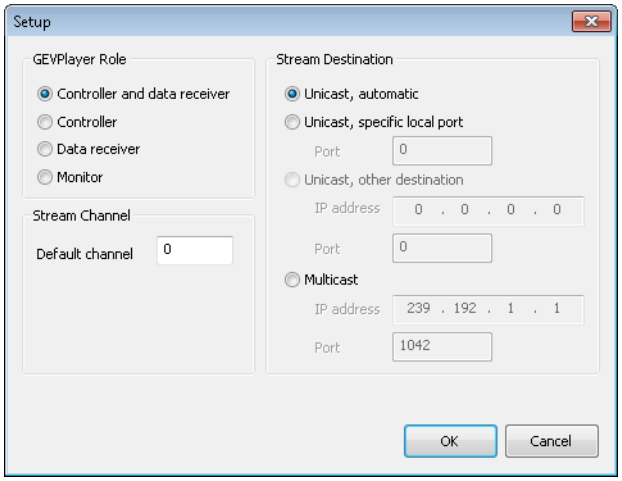

7. Set **GevSCDA** to a multicast address (for example, 239.192.1.1).
8. Close the **Device Control** dialog box.
9. Now, configure the iPORT Analog-Pro IP engine, as outlined in "To configure the iPORT Analog-Pro IP engine for a multicast network configuration" on page 40.

### To configure the iPORT Analog-Pro IP engine for a multicast network configuration

1. Start an additional instance of GEVPlayer.
2. Click **Tools** > **Setup**.




3. Under **GEVPlayer Role**, click **Controller and data receiver**.

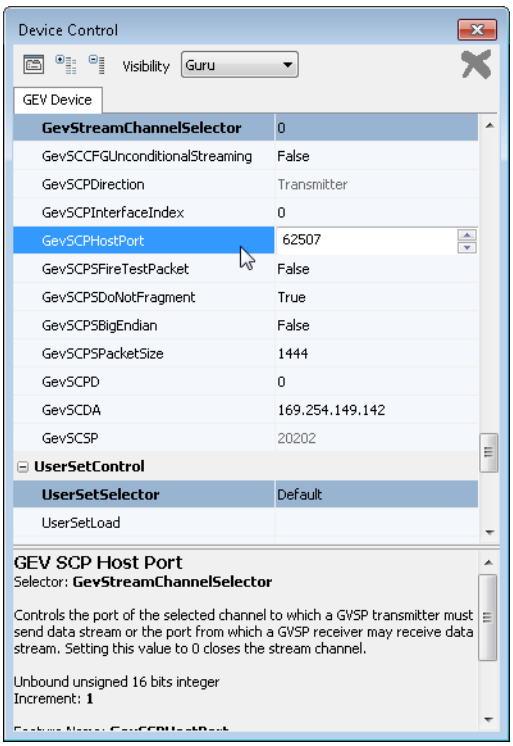



4. Under **Stream Destination**, click **Multicast** and enter the **IP address** and **Port** number.

   The address and port must be identical to that configured for the vDisplay HDI-Pro IP engine in step 6 and 7 of "To configure the vDisplay HDI-Pro IP engine for a multicast network configuration" on page 38.
5. Click **OK**.
6. Connect to the iPORT Analog-Pro IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.
7. Click **Device control**.
8. Click **Guru** in the **Visibility** list.

9. In the **TransportLayerControl** category, ensure that the multicast IP address in the **GevSCDA** field and the port in the **GevSCPHostPort** field are correct. They are configured automatically to the values set in steps 3-5 of this procedure.




10. Set **Deinterlacing** to **Line Duplication** or **Weave** (because the vDisplay HDI-Pro IP engine does not perform deinterlacing).
11. Change the height to one of the following settings, depending on the video input standard:
    - **NTSC.** 480
    - **PAL.** 576
12. Under **AnalogControl** > **InputVideoFormat**, ensure the correct **InputVideoFormat** is selected.

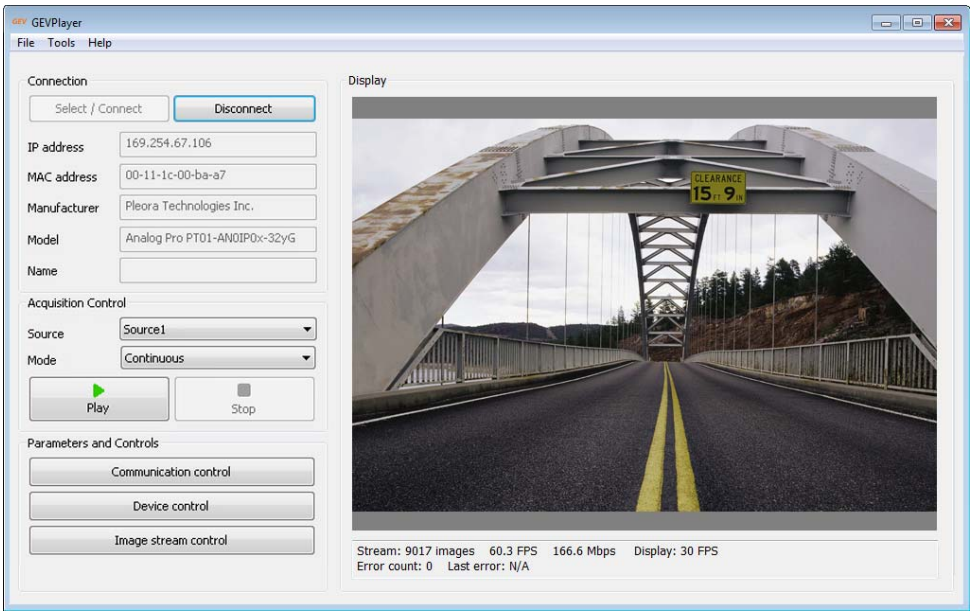
    For example, if the IP engine is connected to an NTSC camera, ensure that **CompositeNTSC** is selected and ensure that **ImageFormatControl** > **TestImageSelector** is set to **Off**. If a camera is not connected, ensure that **ImageFormatControl** > **TestImageSelector** is set to **On**, and optionally select a **TestPatternFormat**.

After you change the **Deinterlacing** and **InputVideoFormat** features, you may need to adjust the **Width**, **Height**, or image offset (as the settings may now be invalid).

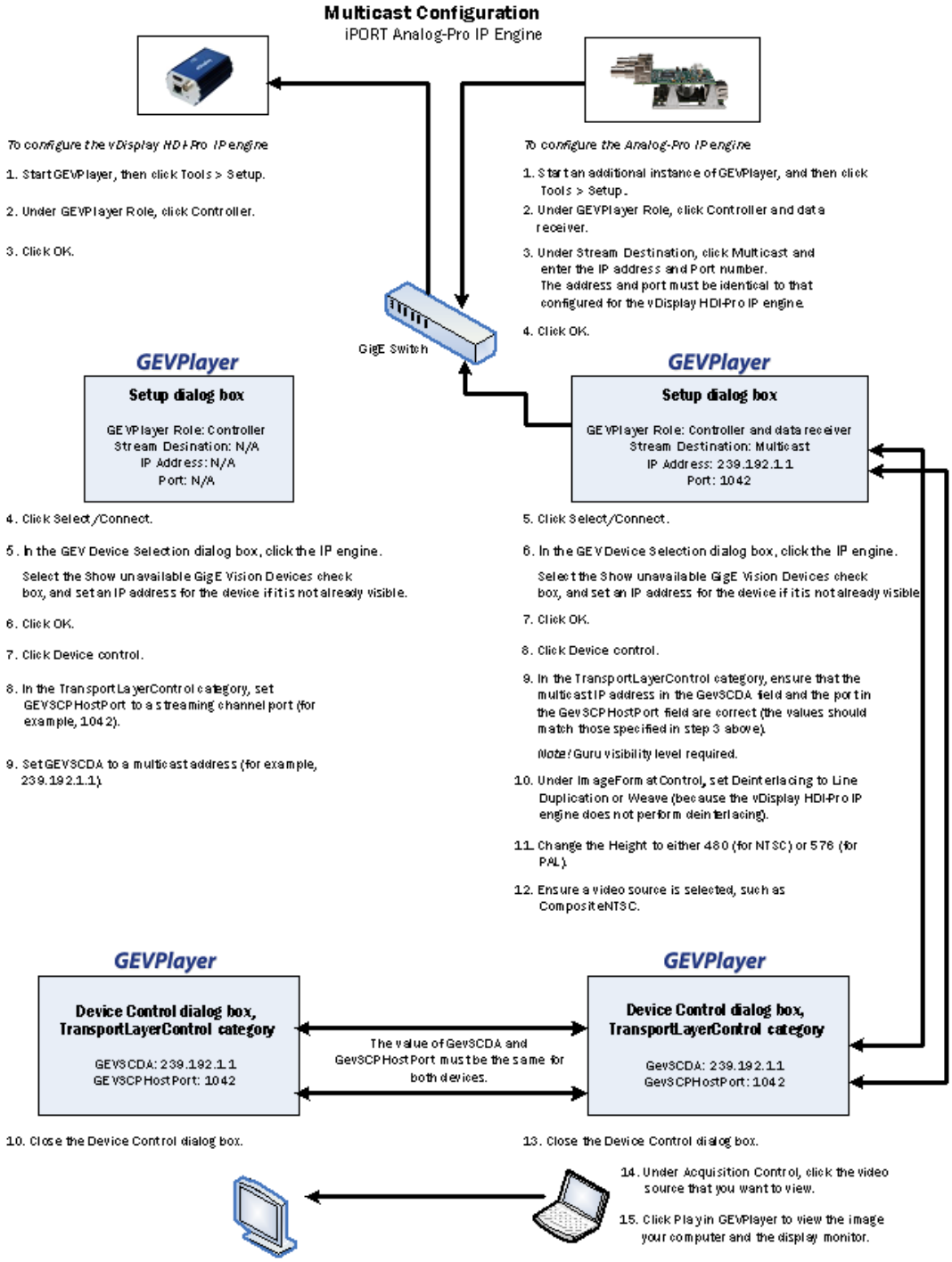
We recommend that you avoid using the test pattern when both video channels are in use and the IP engine is configured with the following settings: **PixelFormat: YUV422Packed** and **Deinterlacing: Line Duplication**.

13. Close the **Device Control** dialog box.
14. Under **Acquisition Control**, click the source to which the camera you want to view is connected.

**15.** Click **Play** to view the source video both on the computer and the display monitor. The multicast image is shown on the display monitor, as shown below.




An overview of the steps for the simple multicasting of the iPORT Analog-Pro IP engine in conjunction with the vDisplay HDI-Pro IP engine is shown in the following figure.



# Configuring the Buffers

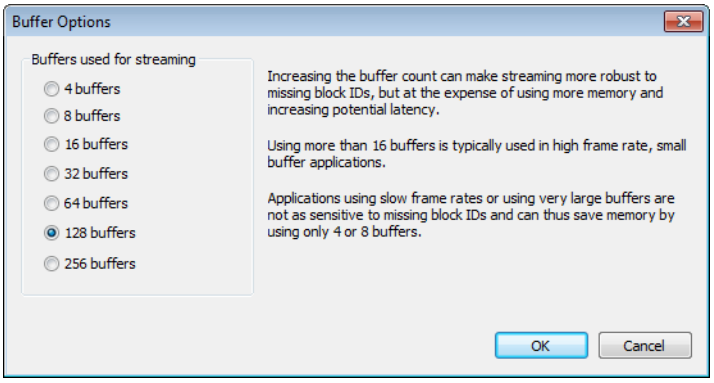
You can increase the buffer count in GEVPlayer to reduce the impact of lost and out-of-order packets, and to make streaming more robust. A high number of buffers are needed in high frame rate applications, while a small number of buffers are needed for lower frame rates. Applications using a high number of buffers might experience greater latency.

## To configure the buffers

1. Start GEVPlayer and connect to the IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.
2. Click **Tools** > **Buffer Options**.
3. Click the buffer option that suits your requirements.
4. Click **OK**.

Default size for streaming is 16 buffers.



# Configuring the Image and Deinterlacing Settings

You can configure the IP engine's image and deinterlacing settings based on the video input device that is connected to the IP engine and based on your requirements.

For an overview of the deinterlacing feature, see "Hardware Deinterlacing" on page 8.

While the GEVPlayer **Device Control** dialog box includes a **SourceSelector**, which allows you to choose between the video inputs, this guide does not require you to select a source (as this guide only requires you to configure general IP engine settings that apply to both inputs). The **SourceSelector** feature (available in eBUS SDK version 2.2 and later) is discussed in the *GEVPlayer Quick Start Guide* and *GEVPlayer User Guide*.

## To configure the image and deinterlacing settings

1. Start GEVPlayer and connect to the IP engine.

   For more information, see "To start GEVPlayer and connect to a device" on page 29.
2. Click **Device Control** in the **Parameters and Controls** section.
3. For cameras that transmit interlaced video, under **ImageFormatControl** set **Interlaced** to **True**. Then, perform step 4. For cameras that transmit deinterlaced video, skip step 4 and go to step 5.
4. Under **ImageFormatControl**, configure deinterlacing/interlacing based on your requirements:

   To stream deinterlaced video, modify the following options to change the output of the IP engine so the IP engine performs deinterlacing.

   - **Deinterlacing.** Set this option to **Weave** or **LineDuplication**.
   - **Image Height.** Depending on the video standard (NTSC or PAL), this option should be set to one of the following image heights:
     - **NTSC deinterlaced.** 480
     - **PAL deinterlaced.** 576

If you are streaming video to a vDisplay HDI-Pro IP engine, you should configure the IP engine to perform deinterlacing (because the vDisplay HDI-Pro IP engine does not perform deinterlacing).

*Continued on next page...*

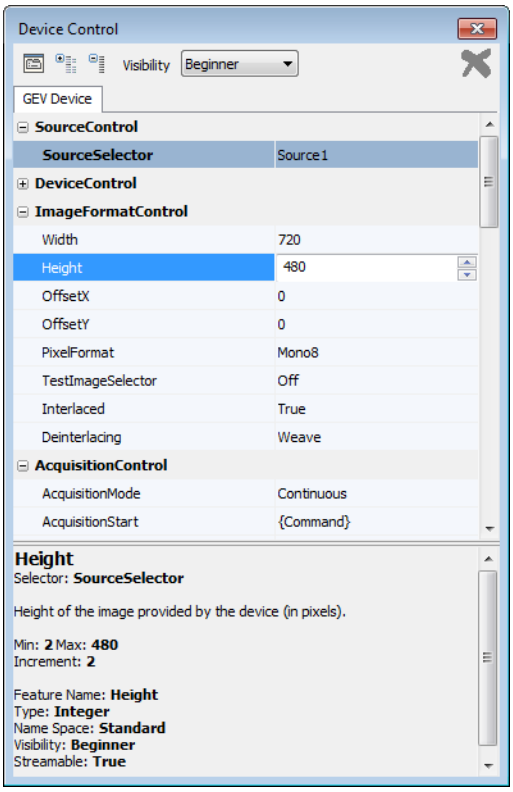
To stream interlaced video, modify the following options to change the output of the IP engine so the IP engine does not perform deinterlacing.

- **Interlaced**. Set this option to **True**.
- **Deinterlacing**. Set this option to **Off**.

The IP engine does not perform interlacing. Instead, interlacing can be performed by the software that receives the video stream, such as GEVPlayer.

The maximum image height (the height of an individual field) for interlaced NTSC and PAL video is 240 and 288, respectively.

After you change the **Interlaced** and **Deinterlacing** features, you may need to adjust the **Width**, **Height**, or image offset (as the settings may now be invalid).




5. Close the **Device Control** dialog box.

# Implementing the eBUS SDK

You can create your own image acquisition software for the IP engine. Consult the *eBUS SDK C++ Reference Guide* for information about creating custom image acquisition software.

# Chapter 7

## System Troubleshooting

This chapter provides you with troubleshooting tips and recommended solutions for issues that can occur during configuration, setup, and operation of the Analog-Pro IP engine.

Not all scenarios and solutions are listed here. You can refer to the Pleora Technologies Support Center at www.pleora.com for additional support and assistance.

The Pleora Technologies Support Center can help you to learn more about integrating Pleora Technologies products. Use keywords to search the Pleora Technologies knowledge database for solutions and suggestions to optimize and troubleshoot Pleora Technologies products. The knowledge database includes a description of the issue and the suggested solution for your search results.

Details for creating a customer account are available at the Pleora Technologies Support Center.

Refer to the product release notes that are available at the Pleora Technologies Support Center for known issues and other product features.

# Troubleshooting Tips

The scenarios and known issues listed in the following table are those that you might encounter during the setup and operation of your IP engine. Not all possible scenarios and errors are presented. The symptoms, possible causes, and resolutions depend upon your particular network, setup, and operation.

If you perform the resolution for your issue and the issue is not corrected, we recommend you review the other resolutions listed in this table. Some symptoms may be interrelated.

Table 10: Troubleshooting Tips

| Symptom | Possible cause | Resolution |
|---|---|---|
| SDK cannot detect or connect to the IP engine | Power not supplied to the IP engine | Both the detection and connection to the IP engine will fail if power is not supplied to the device.<br>Verify that the network activity LED (JI on the main board) is either green (power on) or orange (flashes when data is streaming). For information about the LEDs, see “Status LEDs” on page 17.<br>Verify the power connection and ensure a minimum of 5V is present at the connector (maximum: 16V).<br>Re-try the connection to the IP engine with GEVPlayer. |
| | IP engine not connected to the network | Verify that the network activity LED and network connection speed LED are active (J1 on the main board). If these LEDs are illuminated, check the LEDs on your network switch to ensure the switch is functioning properly. If the problem continues, connect the IP engine directly to the computer to verify its operation. For information about the LEDs, see “Status LEDs” on page 17. |
| | IP engine and computer are not on the same subnet | Video might not appear in GEVPlayer if the IP engine and the computer running GEVPlayer are not on the same subnet. Ensure that these devices are on the same subnet. In addition, ensure that these devices are connected using valid gateway and subnet mask information. You can view the IP engine IP address information in the **Available GigE Vision Devices** list in GEVPlayer. A red icon appears beside the GigE Vision device if there is an invalid IP configuration. |

Table 10: Troubleshooting Tips (Continued)

| Symptom | Possible cause | Resolution |
|---|---|---|
| SDK is able to connect, but no video appears in GEVPlayer | Anti-virus software or firewalls blocking transmission | Video might not appear in GEVPlayer because of anti-virus software or firewalls on your network. Disable all virus scanning software and firewalls, and re-attempt a connection to the IP engine with GEVPlayer. |
| | IP engine not configured correctly to support multicast configuration | Video might not appear on the display if you have not configured the IP engine for a multicast video network configuration. The IP engine and all multicast receivers (for example, a vDisplay HDI-Pro IP engine) must have identical values for both the **GevSCDA** and **GevSCPHostPort** attributes in the **TransportLayerControl** section. For more information, see "Configuring the vDisplay HDI-Pro IP Engine and iPORT Analog-Pro IP Engine for a Multicast Network Configuration" on page 38. |
| | Non-continuous acquisition in interlaced mode | Images will not appear in GEVPlayer during single-frame acquisition mode or after the first acquisition of a multi-frame acquisition when the **Deinterlacing** setting on the IP engine is set to **None.** The acquisition of a single frame in this mode corresponds to the acquisition of a single field. GEVPlayer waits to receive two fields before deinterlacing and displaying the image. Applications written using the eBUS SDK may choose to operate differently than GEVPlayer. |
| | Incorrect input video format selected | Images will not appear in GEVPlayer if the value of **the InputVideoFormat** field in the **AnalogControl** section is incorrect. For example, images will not appear if the value of **InputVideoFormat** is **CompositeNTSC**, but the camera connected to the IP engine transmits video using the PAL video standard. |
| Dropped packets: GEVPlayer, NetCommand, or applications created using the eBUS SDK | Insufficient computer performance | The computer being used to receive images from the IP engine may not perform well enough to handle the data rate of the image stream. The eBUS Universal Pro driver reduces the amount of computer resources required to receive images, and is recommended for applications that require high throughput. Should the application continue to drop packets even after the installation of the eBUS Universal Pro driver, a computer with better performance may be required. |
| | Insufficient NIC performance | The NIC being used to receive images from the IP engine may not perform well enough to handle the data rate of the image stream. For example, the bus connecting the NIC to the CPU may not be fast enough, or certain default settings on the NIC may not be appropriate for reception of a high-throughput image stream. Examples of NIC settings that may need to be reconfigured include the number of Rx Descriptors and the maximum size of Ethernet packets (jumbo packets). Additionally, some NICs are known to not work well in high-throughput applications. Refer to the *Network Adapters Knowledge Base Technical Note*, available at the Pleora Technologies Support Center. |
| Black bars appear on the sides of the video | Camera does not output video using the full image size | In GEVPlayer, adjust the **Width**, **Height**, and image offset features until the black bars no longer appear. |

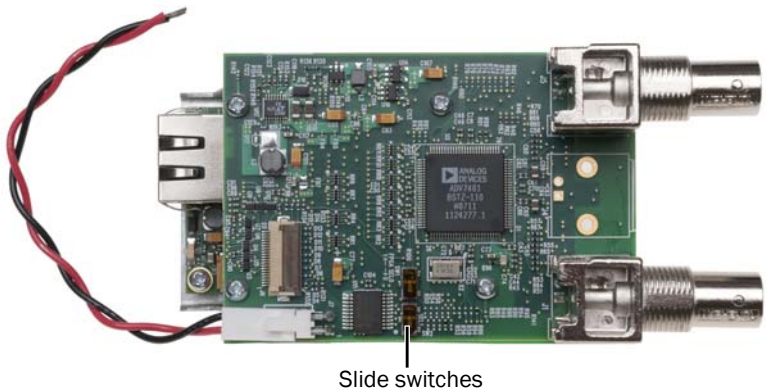
Table 10: Troubleshooting Tips (Continued)

| Symptom | Possible cause | Resolution |
|---|---|---|
| Images are not properly sized or are not properly positioned in the window | Image width, height, or offset not set correctly, based on the **InputVideoFormat**, **Interlaced**, and **Deinterlacing** features | In GEVPlayer, adjust the **Width**, **Height**, **OffsetX**, and **OffsetY** to the correct value, based on the **InputVideoFormat**, **Interlaced**, and **Deinterlacing** settings that you configured. |
| Exclamation marks appear beside the **Width**, **Height**, **OffsetX**, or **OffsetY** features in GEVPlayer | | |

# Changing to the Backup Firmware Load

In some cases, you may need to change from the main firmware load to the backup firmware load. You can use the slide switches (SW1 and SW2 on the daughter card) to change to the backup firmware mode.

To access the slide switches, peel back the small, protective plastic sheet that covers each slide switch.



Slide switches
(SW1 and SW2 on the daughter card)

Table 11: Slide Switch Settings

| SW1 slide switch | SW2 slide switch | FPGA load |
|---|---|---|
| Off (labeled OF) | Off (labeled OF) | Main load |
| Off (labeled OF) | On | Backup load |
| On | Off (labeled OF) | Backup load |
| On | On | Backup load |

# Chapter 8

# Reference: Mechanical Drawings and Material List

This chapter provides the mechanical drawings, and also provides a list of connectors and cables, with corresponding manufacturer details.

Three-dimensional (3-D) mechanical drawings are available at the Pleora Technologies Support Center.

The following topics are covered in this chapter:

# Mechanical Drawings

The mechanical drawings in this section provide the IP engine's dimensions, features, and attributes. All dimensions are in inches, followed by millimeters.

Figure 3: Main Board

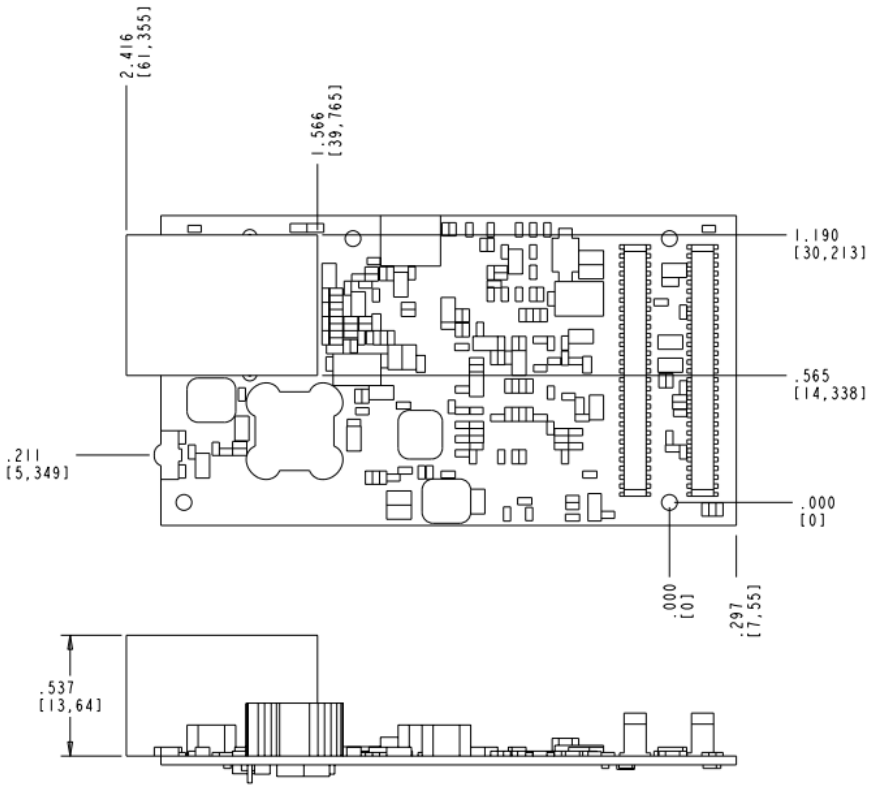


Figure 4: Main Board

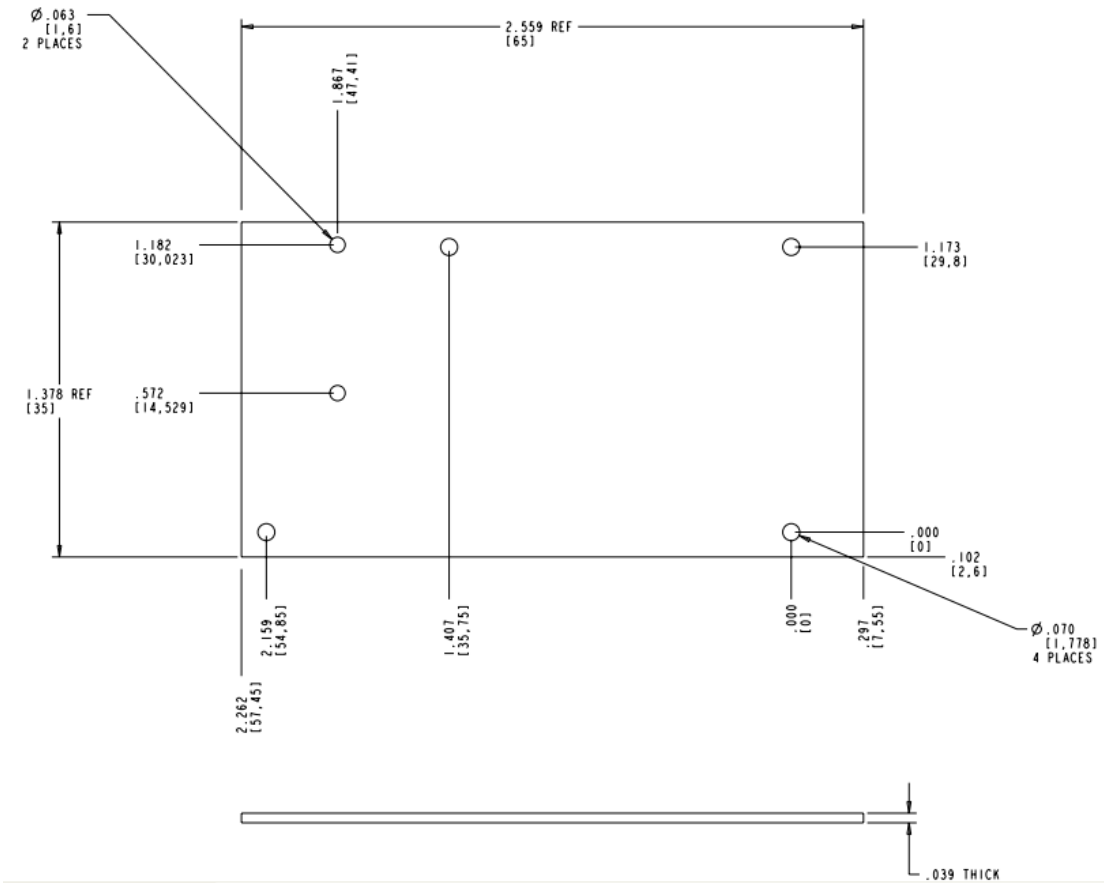



Figure 5: Daughter Card

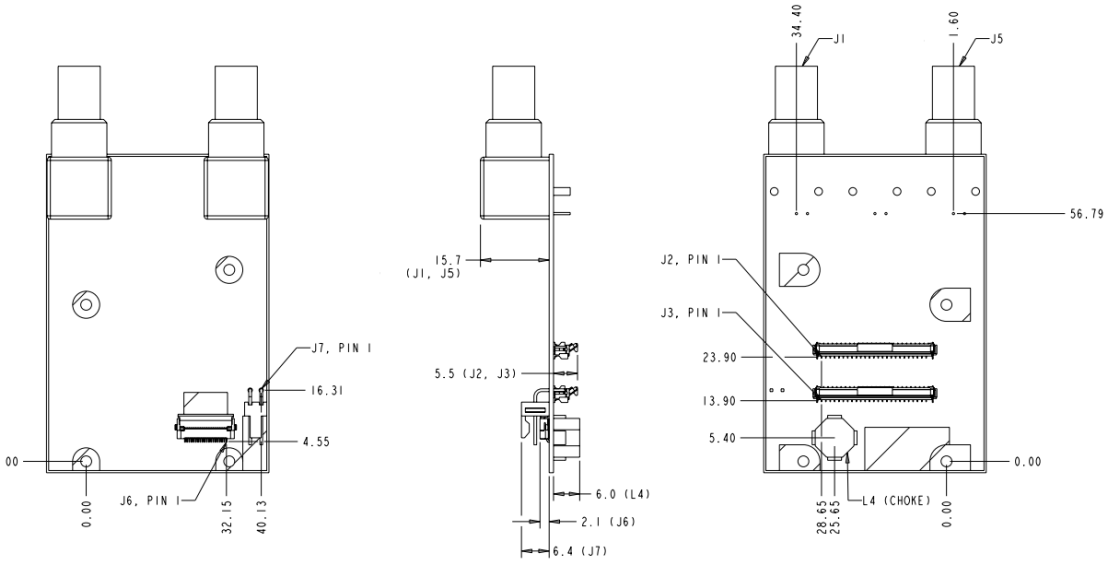


Figure 6: Daughter Card

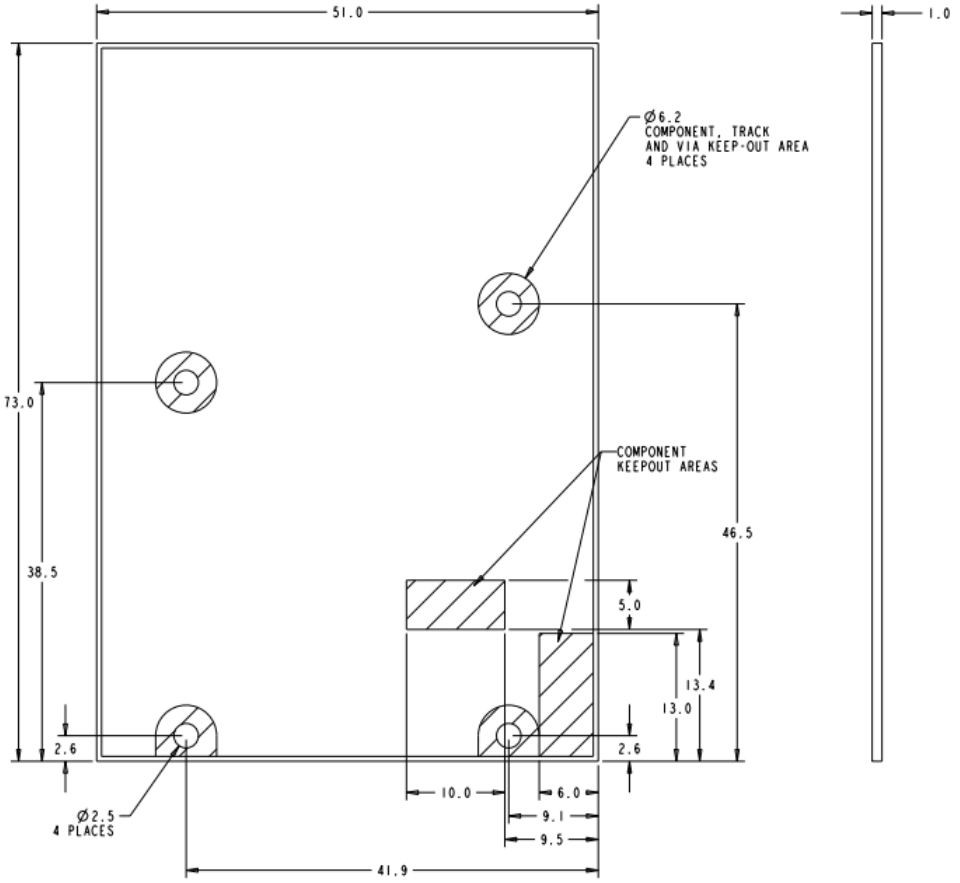


Figure 7: Bracket

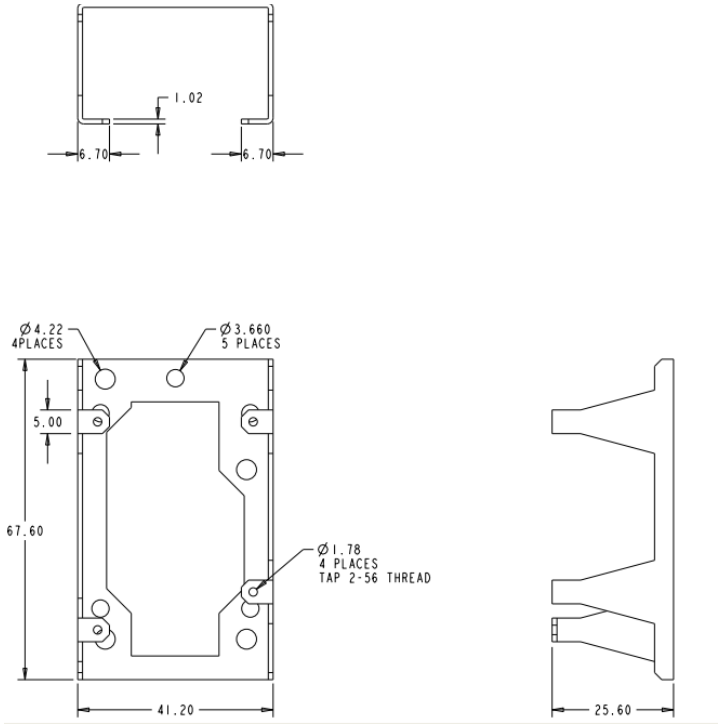


Figure 8: 12-Pin GPIO and Serial Connector

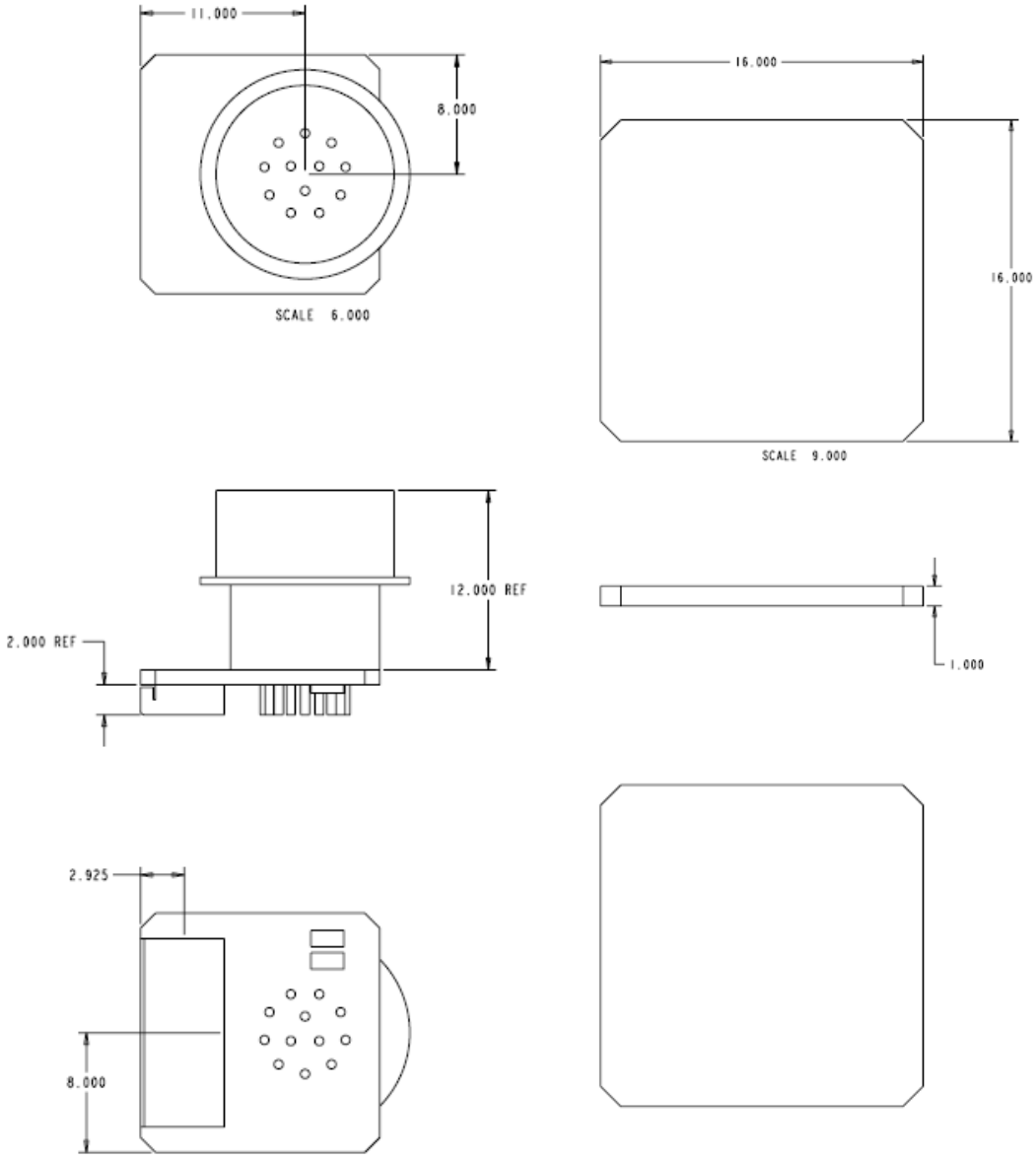


Figure 9: 12-Pin GPIO and Serial Connector

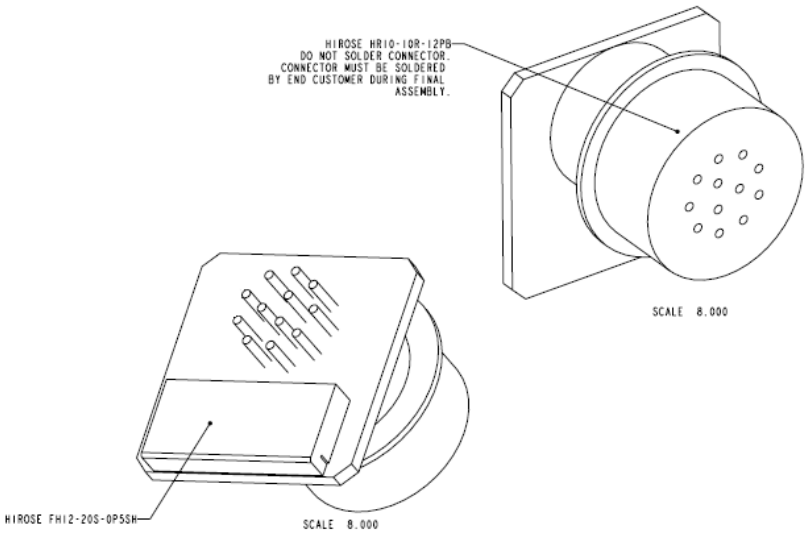


Figure 10: Enclosure — Top and Side View

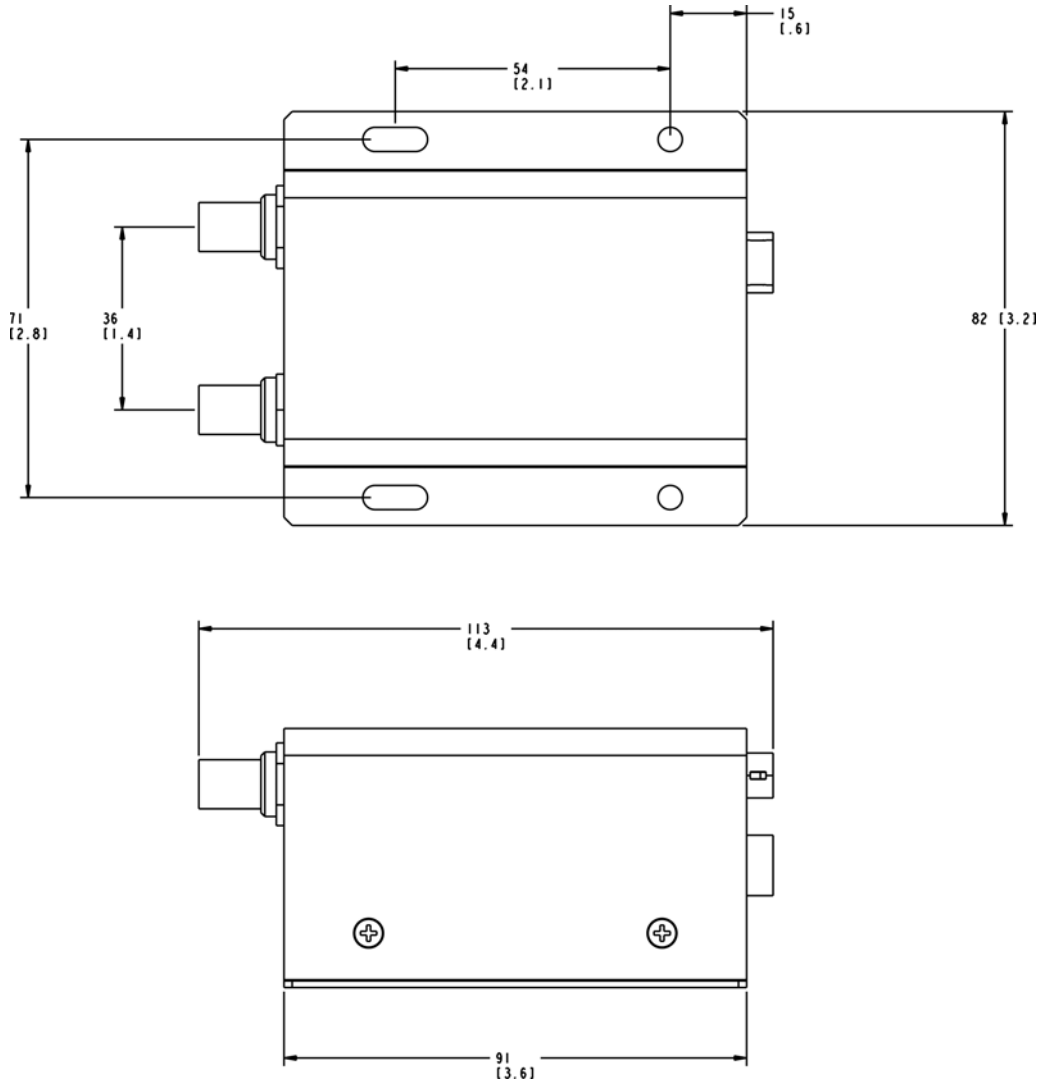
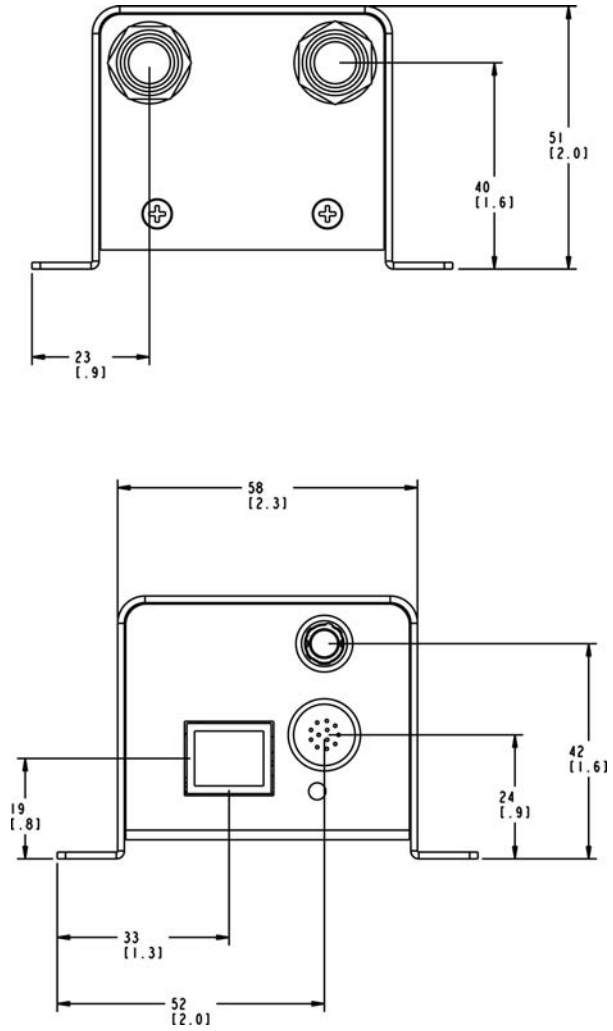


Figure 11: Enclosure — Front and Back Views



# Material List

The connector and cable summaries for the IP engine are listed in the following tables.

Table 12: Connector Summary

| ID | Location | Description | Manufacturer part number | Manufacturer |
|---|---|---|---|---|
| **Analog-Pro IP Engine Board Set** | | | | |
| J1 | Main board | RJ-45 jack, green/green LED, horizontal | HFJ11-1G11E-L11RL | Halo |
| J1, J5 | Daughter card | BNC connectors, right angle, 75-ohm | 31-71043-1010 | Amphenol |
| J1 | Adapter board | 12-pin circular connector, female | HR10A-10R-12SB(71) | Hirose |
| UI | Adapter board | 20-pin FPC/FFC connector, 0.5mm pitch, gold, horizontal, SMD | FH12-20S-0.5SH(55) | Hirose |
| J6 | Daughter card | 20-pin FPC/FFC connector, 0.5mm pitch, gold, horizontal, SMD | FH12-20S-0.5SH(55) | Hirose |
| J7 | Daughter card | 2-pin header, horizontal | 22-05-3021 | Molex |
| **Enclosed Analog-Pro IP Engine** | | | | |
| 6-pin circular connector, male | | | HR10A-7R-6P(73) | Hirose |
| 12-pin circular connector, female | | | HR10A-10R-12SB(71) | Hirose |

The IP engine uses a straight-through Ethernet cable (not a crossover cable); it can automatically adjust the signals to communicate either through a switch or directly to a host computer. It also adjusts the data rate automatically to transmit at 10 Mbps, 100 Mbps, or 1 Gbps.

Table 13: Analog-Pro IP Engine Board Set Cable Summary

| Cable from | Cable to | Description | Manufacturer part number | Manufacturer |
|---|---|---|---|---|
| J6 (daughter card) | J1 (adapter board) | 20-pin FFC, 2" length, 0.5mm pitch | MCC20-51-4/6-H1 | Flexconn |
| | | | FFC0.50A20/0043S440606SAKK/AU | Axon |
| | | | 150200207 | Molex |
| Main board (x2) | Daughter card (x2) | 50-pin FFC,0.5mm pitch* | FFC0.50A50/0043S440606SAKK/AU | Axon |
| | | | MCC50-51-4/6-H1 | Flexconn |
| | | | 150200537 | Molex |

* Pleora Technologies has verified satisfactory operation with cables between the IP engine and camera heads that exceed 6 inches (15 centimeters). However, we strongly caution against the use of long cables, unless you have extensive experience in the areas of large-scale grounding and Electromagnetic Compatibility (EMC).

Source manufacturer, description, and identification may vary for each connector and cable.

# Chapter 9

# Technical Support

At the Pleora Support Center, you can:

- Download the latest software.
- Log a support issue.
- View documentation for current and past releases.
- Browse for solutions to problems other customers have encountered.
- 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 Pleora Support Center

- Go to www.pleora.com and click **Support Center**.

  If you have not registered yet, you are prompted to register.

  Accounts are usually validated within one business day.

If you have difficulty finding 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.