PLEORA TECHNOLOGIES INC.

iPORT™ CL-Ten External Frame Grabber

User Guide

Pleora Technologies

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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 CL-Ten External Frame Grabber to Camera Link® Base, Medium, and Full (including Deca and 80-bit) mode cameras. In this guide you can find a product overview, instructions for connecting the cables, installing the Pleora eBUS™ SDK, establishing an Ethernet connection, performing general configuration tasks, and configuring the settings to properly capture and display images from Camera Link cameras.

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

Related Documents

The *iPORT CL-Ten External Frame Grabber User Guide* is complemented by the following guides:

- *eBUS Player Quick Start Guide*
- *eBUS Player User Guide*
- *eBUS SDK Programmer's Guide*
- *eBUS SDK C++ API Quick Start Guide*
- *eBUS SDK .NET API Quick Start Guide*
- *GigE Vision Standard*, version 2.0 available from the Automated Imaging Association (AIA) at www.visiononline.org
- *GenICam Standard Features Naming Convention* available from the European Machine Vision Association (EMVA) at www.emva.org
- *Camera Link Standard*, available from the Automated Imaging Association (AIA) at www.visiononline.org
- *iPORT Advanced Features User Guide*

Chapter 2

About the iPORT CL-Ten External Frame Grabber

This chapter describes the external frame grabber, including the product variants and key features.

The following topics are covered in this chapter:

The iPORT CL-Ten External Frame Grabber

Pleora's iPORT™ CL-Ten External Frame Grabbers use a high-performance GigE Vision® 2.0 over 10 Gigabit Ethernet (10 GigE) link to transmit video simultaneously from two Camera Link Base or Medium cameras, or a single Camera Link Full camera at maximum data rates, with low, predictable latency. These external frame grabbers allow designers to extend and aggregate system cabling, and integrate Camera Link cameras into a networked environment.

CL-Ten External Frame Grabbers interact seamlessly with Pleora's other products in networked or point-to-point digital video systems. The frame grabbers also comply fully with the GigE Vision and GenICam™ standards, enabling interoperation with third-party equipment in multi-vendor environments. The GigE Vision and GenICam standards are agnostic to Ethernet link speed, which means the CL-Ten can be designed into multi-speed systems alongside GigE Vision cameras operating at 1 Gb/s, with no software modifications. Deploying the CL-Ten, manufacturers and integrators can shorten time-to-market, reduce development and deployment risk, and lower design and system costs.

The CL-Ten converts video data to packets and sends them over a 10 GigE link to receiving software or hardware. The CL-Ten is compatible with industry-standard fiber-based links via an SFP+ (small form-factor pluggable) connector, and can be easily connected to off-the-shelf 10 GigE components such as network cards and switches.

A sophisticated on-board programmable logic controller (PLC) allows users to precisely measure, synchronize, trigger, and control the operation of other vision system elements.

The CL-Ten is bundled with Pleora's feature-rich application toolkit, eBUS™ SDK.

iPORT CL-Ten Full
External Frame Grabber

iPORT CL-Ten Dual Medium
External Frame Grabber

Model Variants

The iPORT CL-Ten External Frame Grabber is available in several models and is equipped with the parts listed in the following table.

Table 1: Model Variants

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

Order Code	iPORT CL-Ten External Frame Grabber Package Model	Quantity
905-0001	**iPORT CL-Ten Dual Medium External Frame Grabber in Mountable Enclosure**	**Quantity**
	iPORT CL-Ten Dual Medium External Frame Grabber enclosed unit Supports Camera Link Base and Medium modes	1

905-0003	**iPORT CL-Ten Dual Medium External Frame Grabber Development Kit Fiber**	**Quantity**
	iPORT CL-Ten Dual Medium External Frame Grabber enclosed unit	1
	10 Gigabit Ethernet network interface card (NIC)	1
	10 Gigabit enhanced small form-factor pluggable (SFP+) fiber module, short range	2
	Multimode fiber optic cable, 2 meters	1
	12V power supply	1
	Pleora eBUS SDK, provided on CD or USB stick (includes eBUS Player sample application)	1

905-0008	**iPORT CL-Ten Full External Frame Grabber in Mountable Enclosure**	**Quantity**
	iPORT CL-Ten Full External Frame Grabber enclosed unit Supports Camera Link Base, Medium, Full, and 80-bit modes	1

905-0009	**iPORT CL-Ten Full External Frame Grabber Development Kit Fiber**	
	iPORT CL-Ten Full External Frame Grabber enclosed unit	1
	10 Gigabit Ethernet network interface card (NIC)	1
	10 Gigabit enhanced small form-factor pluggable (SFP+) fiber module, short range	2
	Multimode fiber optic cable, 2 meters	1
	12V power supply	1
	Pleora eBUS SDK, provided on CD or USB stick (includes eBUS Player sample application)	1

Feature Set

Table 2: iPORT CL-Ten External Frame Grabber Feature Summary

Key features
10 Gigabit Ethernet-based. Supports IGMPv2 and ICMP.
Camera Link support: • CL-Ten Dual Medium is compatible with Base and Medium mode cameras up to 85 MHz* • CL-Ten Full is compatible with Base, Medium, Full, and 80-bit cameras up to 85 MHz • Supports Power over Camera Link (PoCL) • Supports CLProtocol
Supports 10GBASE-SR, -LR, and -LRM using linear or limiting SFP+ modules
**Supports interleaved 2-tap and 4-tap configurations Supports interleaved 8-tap and 10-tap configurations (CL-Ten Full model only)
Software-controlled GPIO: • 4 TTL (5V) general purpose inputs • 2 TTL (5V) general purpose outputs
1 UART on Camera Link interface and 1 RS-232 on GPIO connector allow serial control of cameras and other devices using a computer application over the network link
Compatible with GigE Vision Standard, version 2.0. Operates with GigE Vision and GenICam compatible applications.
Environmental and Physical
Power consumption (measured at 12V, no camera powering through PoCL): • 11.5W typical (while streaming at full bandwidth)
Storage temperature: -40° to 85°C
Operating temperature: • 0° to 55°C with commercial temperature SFP+ module • 0° to 65°C with industrial temperature SFP+ module
Dimensions (L x W x H): • 117 mm x 100 mm x 83.5 mm

* Two Base mode cameras can be connected (using the Medium 1A and Medium 2A connectors).

** When using Base mode cameras, 1 and 2 tap configurations are available.

Selected GenICam Features

The iPORT CL-Ten External Frame Grabber supports the seven features mandated by the GigE Vision standard along with additional features, some of which are shown in the following table. The full list of features can be seen in the Device Control dialog box of Pleora's eBUS Player application.

Table 3: Selected GenICam Features

Feature	Description
Width*	Specifies the width of the image (in pixels).
Height*	Specifies the height of the image (in pixels).
OffsetX	Specifies the horizontal image offset (in pixels).
OffsetY	Specifies the vertical image offset (in pixels).
PixelFormat*	Specifies the format of the pixel provided by the device. Available pixel formats are: • Monochrome pixel formats, 8 to 16 bits • Bayer pixel formats, 8 to 16 bits • RGB pixel formats, 8 to 12 bits per component
DeviceReset	Resets the external frame grabber to its power up state.
ActionUnconditionalMode**	Enables the unconditional action command mode where action commands are processed even when the primary control channel is closed.
ActionDeviceKey**	Provides the device key that allows the device to check the validity of action commands.
ActionQueueSize**	Indicates the size of the scheduled action commands queue. This number represents the maximum number of scheduled action commands that can be pending at a given point in time.
ActionSelector**	Selects to which Action Signal further Action settings apply.
ActionGroupMask**	Provides the mask that the device will use to validate the action on reception of the action protocol message.
ActionGroupKey**	Provides the key that the device will use to validate the action on reception of the action protocol message.
ClConnectorSelector	Selects the Camera Link interface to configure.
ClSafePowerActive	Controls whether the SafePower protocol is active. SafePower is a protocol to prevent the external frame grabber from attempting to supply power to a conventional (non-PoCL) cable or camera.
ClSafePowerStatus	Reports the status of the SafePower controller.
SourceCount*	Controls the number of sources supported by the device.
DeviceScanType*	Specifies the sensor scan type, such as areascan or linescan.

Table 3: Selected GenICam Features (Continued)

Feature	Description
DeviceTapGeometry*	Describes the geometrical properties characterizing the taps of a Camera Link camera as seen from the external frame grabber or acquisition card. The device tap geometry feature is specific to Camera Link. Available tap geometries are: • Geometry_1X_1Y • Geometry_1X2_1Y • Geometry_1X • Geometry_1X2 • Geometry_1X4_1Y • Geometry_1X4 • Geometry_2X2E • Geometry_1X8_1Y (CL-Ten Full model only) • Geometry_1X8 (CL-Ten Full model only) • Geometry_1X10_1Y (CL-Ten Full model only) • Geometry_1X10 (CL-Ten Full model only)
GevIEEE1588**	Enables the IEEE 1588 Precision Time Protocol to control the timestamp register.
GevIEEE1588Status**	Provides the state of the IEEE 1588 clock.
SensorDigitizationTaps*	Specifies the number of digitized samples that are simultaneously output by the camera A/D conversion stage.
DigitizedImageWidth*	Width of the image provided by the Camera Link camera (in pixels).
DigitizedImageHeight*	Height of the image provided by the Camera Link camera (in pixels).

* These features are interrelated. When you change any of these values, the external frame grabber may automatically adjust the other values to ensure the configuration is valid.

** For information about using the action command and IEEE1588 features, see the *iPORT Advanced Features User Guide*, available on the Pleora Support Center at www.pleora.com.

Chapter 3

iPORT CL-Ten External Frame Grabber Connectors

This chapter describes the external frame grabber connectors. It also includes pinouts for the GPIO, serial, and power connector.

The following topics are covered in this chapter:

CL-Ten Dual Medium External Frame Grabber Connectors

The following table describes the CL-Ten Dual Medium External Frame Grabber connectors.

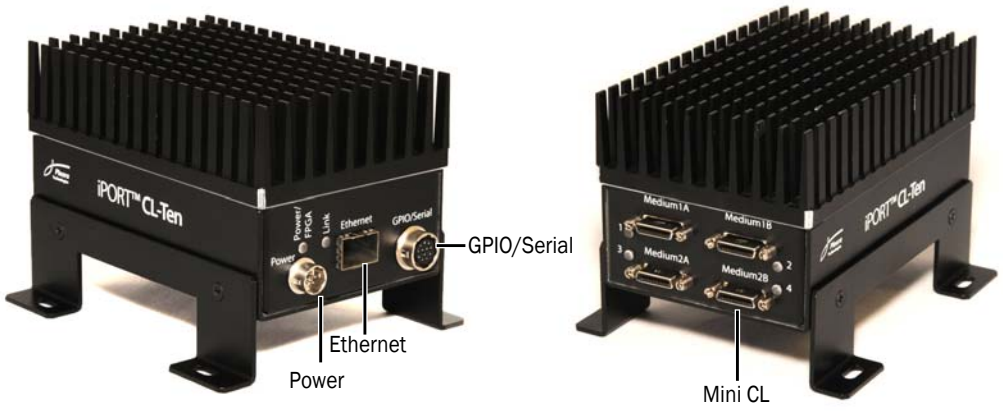


Table 4: CL-Ten Dual Medium External Frame Grabber Connectors

Connector	Type	Description
Medium	Mini Camera Link	Transmits images from a Camera Link camera to the external frame grabber through a Camera Link cable. You can connect two Medium mode cameras to the external frame grabber (connect one camera to the connectors labeled **Medium 1** and connect the other camera to the connectors labeled **Medium 2**). The **Medium 1A** and **Medium 2A** connectors correspond to Connector 1, and the **Medium 1B** and **Medium 2B** connectors correspond to **Connector 2**, as described in the Camera Link Specification. To use the external frame grabber in a Camera Link Base configuration, you can connect one camera to the **Medium 1A** connector and the other to the **Medium 2A** connector. If PoCL is enabled, for each connector, 4W at 12V is supplied to the camera, as outlined in the PoCL v1.2 standard.
Power	6-pin connector	Receives 12V of unfiltered DC input. The power consumption of the external frame grabber is approximately 11.5W. Value excludes PoCL power consumption.

Table 4: CL-Ten Dual Medium External Frame Grabber Connectors

Connector	Type	Description
Ethernet	SFP+ cage	Interfaces the external frame grabber to Ethernet networks, as specified in IEEE 802.3. The Ethernet interface operates at 10 gigabits per second (Gbps), and supports Internet Protocol Version 4 (IPv4).
GPIO/Serial	12-pin connector	Provides external signals, such as serial communication and GPIO, to the external frame grabber.

CL-Ten Full External Frame Grabber Connectors

The following table describes the CL-Ten Full External Frame Grabber connectors.

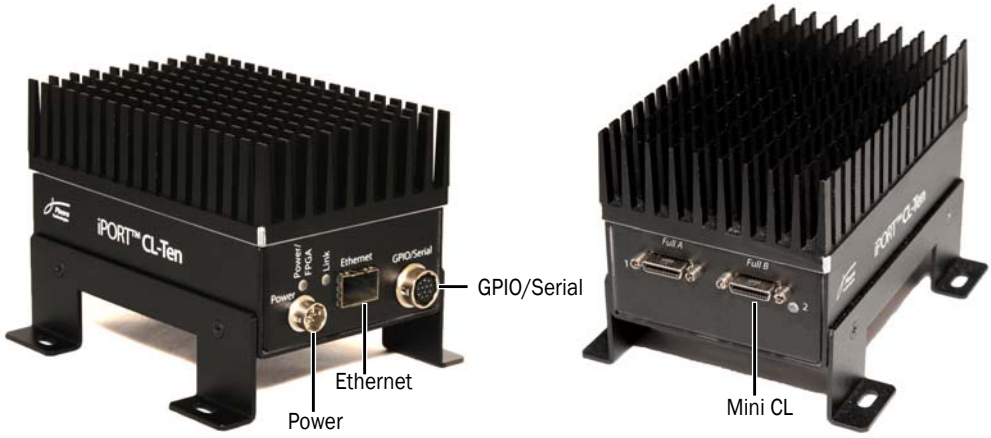


Table 5: CL-Ten Full External Frame Grabber Connectors

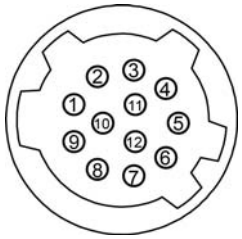
Connector	Type	Description
Full	Mini Camera Link	Transmits images from a Camera Link camera to the external frame grabber through a Camera Link cable. The **Full A** connector corresponds to **Connector 1**, and the **Full B** connector corresponds to **Connector 2**, as described in the Camera Link Specification. To use the external frame grabber in a Camera Link Base configuration, you can connect the camera to the **Full A** connector. If PoCL is enabled, for each connector, 4W at 12V is supplied to the camera, as outlined in the PoCL v1.2 standard.
Power	6-pin connector	Receives 12V of unfiltered DC input. The power consumption of the external frame grabber is approximately 11.5W. Value excludes PoCL power consumption.

Table 5: CL-Ten Full External Frame Grabber Connectors

Connector	Type	Description
Ethernet	SFP+ cage	Interfaces the external frame grabber to Ethernet networks, as specified in IEEE 802.3. The Ethernet interface operates at 10 gigabits per second (Gbps), and supports Internet Protocol Version 4 (IPv4).
GPIO/Serial	12-pin connector	Provides external signals, such as serial communication and GPIO, to the external frame grabber.

GPIO and Serial Connector Pinouts

The GPIO and serial pinout descriptions on the 12-pin female connector are listed in the following table.



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

Table 6: 12-Pin Connector — Pinout Descriptions

Pin	Type	PLC signal name	Notes
1	GPIO output	GpioOut0	Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/-8 kV contact, +/-15 kV air discharge)
2	GPIO input	GpioIn1	ESD information is the same as pin 1 Pull-down 249 kOhm
3	GPIO output	GpioOut1	ESD information is the same as pin 1
4	GPIO input/output	GpioIn2	ESD information is the same as pin 1 Pull-down 249 kOhm
5	Ground		Ferrite bead 0.3A, 600 Ohm @ 100 MHz to DGND of the daughter card
6	GPIO input/output	GpioIn3	ESD information is the same as pin 1 Pull-down 249 kOhm
7	GPIO input/output		No connect

Table 6: 12-Pin Connector — Pinout Descriptions

Pin	Type	PLC signal name	Notes
8	GPIO input/output		No connect
9	3.3 V power output		Maximum 100 mA, protected by 0.2A resettable fuse Ferrite bead 0.3A, 600 Ohm @ 100 MHz to 3.3V
10	GPIO input	GpioIn0	ESD information is the same as pin 1 Pull-down 249 kOhm
11	RS232_RX0 (BULK4 Rx)		ESD information is the same as pin 1
12	RS232_TX0 (BULK4 Tx)		ESD information is the same as pin 1

The GPIO pins on the 12-pin connector are mapped to GpioIn0 through GpioIn3 and GpioOut0 through GpioOut1 of the DigitalIOControl\LineSelector feature in the device's XML file. For information about configuring the external frame grabber with eBUS Player, see "Connecting to the External Frame Grabber and Configuring General Settings" on page 31.

Mapping of Serial Communication Interfaces and Connectors

The mapping of the signals from the Camera Link connector to the bulk interfaces of the camera are provided in the following tables.

CL-Ten Dual Medium External Frame Grabber

Table 7: Mapping of Serial Communication Interfaces and Connectors

Connector	Serial communication interface
Medium 1A	Bulk0
Medium 1B	N/A
Medium 2A	Bulk1
Medium 2B	N/A
GPIO	Bulk4

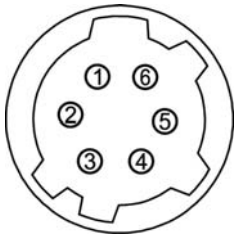
CL-Ten Full External Frame Grabber

Table 8: Mapping of Serial Communication Interfaces and Connectors

Connector	Serial communication interface
Full A	Bulk0
Full B	N/A
GPIO	Bulk4

Power Connector Pinouts

The power connector receives 12V of unfiltered DC input. The external frame grabber's power consumption is approximately 11.5W. Value excludes PoCL power consumption.



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

Table 9: Power Connector Pinout Descriptions

Pin	Name
1	V_{in} 11V to 13V regulated
2	V_{in} 11V to 13V regulated
3	V_{in} 11V to 13V regulated
4	Ground
5	Ground
6	Ground

Chapter 4

Status LEDs

The status LEDs indicate the operating status of the external frame grabber's network connection and firmware. The following figure and table describe the status LEDs.

iPORT CL-Ten Full
External Frame Grabber

iPORT CL-Ten Dual Medium
External Frame Grabber

Table 10: Status LEDs

LED	Description
Power/FPGA	The green LED indicates whether or not the embedded video interface is receiving power. • If this LED is on and not flashing, the embedded video interface is receiving power. • If this LED is off and not flashing, the embedded video interface is not receiving power. Note: This LED can also be off and not flashing for two or three seconds while the FPGA is being configured. If both FPGA loads are corrupted, this LED can remain off even if the embedded video interface is receiving power. The orange LED indicates that the embedded video interface firmware loads are corrupted. Contact Pleora support.
Link	The green LED provides the status of the network connection as well as the status of packets received from the network. • If this LED is on and not flashing, the network is connected at 10Gbps. • If the LED is off and not flashing, the network is not connected. • If the LED is flashing, the network is connected at 10Gbps and Ethernet packets are being received. The orange LED provides the status of packets transmitted to the network. • If the LED is off and not flashing, Ethernet packets are not being transmitted. • If the LED is flashing, Ethernet packets are being transmitted.
1, 2, 3, and 4	**Green (solid).** Power over Camera Link (PoCL) is active for the associated connector. **Off.** PoCL is not active.

Chapter 5

Signal Handling

The CL-Ten External Frame Grabber includes a programmable logic controller (PLC) that lets you control external machines and react to inputs. By controlling your system using the PLC, you can make functional changes, adjust timing, or add features without having to add new hardware.

For an introduction to the PLC and for detailed information about how PLC signals are handled, see the *iPORT Advanced Features User Guide*, available on the Pleora Support Center at www.pleora.com.

The following tables list the PLC input and output programming signals that are specific to the iPORT CL-Ten External Frame Grabber, and indicates the pins on which they are available.

CL-Ten Dual Medium External Frame Grabber

Table 11: PLC Signal Usage

Signal name	PLC equation usage	Notes
Pb0Fval	Input	
Pb0Lval	Input	
Pb0Dval	Input	
Pb0Spare	Input	
Pb1Fval	Input	
Pb1Lval	Input	
Pb1Dval	Input	
Pb1Spare	Input	
GpioIn0	Input	Pin 10 on 12-pin Connector
GpioIn1	Input	Pin 2 on 12-pin Connector
GpioIn2	Input	Pin 4 on 12-pin Connector
GpioIn3	Input	Pin 6 on 12-pin Connector
BufferWM0	Input	
BufferWM1	Input	
Grb0AcqActive	Input	
Grb1AcqActive	Input	
PlcCtrl0	Input	
PlcCtrl1	Input	
PlcCtrl2	Input	
PlcCtrl3	Input	
Pb0CC0	Input, output	
Pb0CC1	Input, output	
Pb0CC2	Input, output	
Pb0CC3	Input, output	
Pb1CC0	Input, output	
Pb1CC1	Input, output	
Pb1CC2	Input, output	

Table 11: PLC Signal Usage (Continued)

Signal name	PLC equation usage	Notes
Pb1CC3	Input, output	
GpioOut0	Input, output	Pin 1 on 12-pin Connector
GpioOut1	Input, output	Pin 3 on 12-pin Connector
PlcFval0	Input, output	
PlcFval1	Input, output	
PlcLval0	Input, output	
PlcLval1	Input, output	
PlcMval0	Input, output	
PlcMval1	Input, output	
PlcTrig0	Input, output	
PlcTrig1	Input, output	
PlcTimestampCtrl	Input, output	
Timer0Trig	Input, output	
Timer0Out	Input	
Timer1Trig	Input, output	
Timer1Out	Input	
Counter0Reset	Input, output	
Counter0Inc	Input, output	
Counter0Dec	Input, output	
Counter0Eq	Input	
Counter0Gt	Input	
Counter1Reset	Input, output	
Counter1Inc	Input, output	
Counter1Dec	Input, output	
Counter1Eq	Input	
Counter1Gt	Input	
Rescaler0In	Input, output	
Rescaler0Out	Input	
Delayer0In	Input, output	
Delayer0Out	Input	
Event0	Input, output	
Event1	Input, output	

Table 11: PLC Signal Usage (Continued)

Signal name	PLC equation usage	Notes
Event2	Input, output	
Event3	Input, output	
ActionTrig0	Input	
ActionTrig1	Input	

CL-Ten Full External Frame Grabber

Table 12: PLC Signal Usage

Signal name	PLC equation usage	Notes
Pb0Fval	Input	
Pb0Lval	Input	
Pb0Dval	Input	
Pb0Spare	Input	
GpioIn0	Input	Pin 10 on 12-pin Connector
GpioIn1	Input	Pin 2 on 12-pin Connector
GpioIn2	Input	Pin 4 on 12-pin Connector
GpioIn3	Input	Pin 6 on 12-pin Connector
BufferWM0	Input	
Grb0AcqActive	Input	
PlcCtrl0	Input	
PlcCtrl1	Input	
PlcCtrl2	Input	
PlcCtrl3	Input	
Pb0CC0	Input, output	
Pb0CC1	Input, output	
Pb0CC2	Input, output	
Pb0CC3	Input, output	
GpioOut0	Input, output	Pin 1 on 12-pin Connector
GpioOut1	Input, output	Pin 3 on 12-pin Connector
PlcFval0	Input, output	
PlcLval0	Input, output	
PlcMval0	Input, output	

Table 12: PLC Signal Usage (Continued)

Signal name	PLC equation usage	Notes
PlcTrig0	Input, output	
PlcTimestampCtrl	Input, output	
Timer0Trig	Input, output	
Timer0Out	Input	
Timer1Trig	Input, output	
Timer1Out	Input	
Counter0Reset	Input, output	
Counter0Inc	Input, output	
Counter0Dec	Input, output	
Counter0Eq	Input	
Counter0Gt	Input	
Counter1Reset	Input, output	
Counter1Inc	Input, output	
Counter1Dec	Input, output	
Counter1Eq	Input	
Counter1Gt	Input	
Rescaler0In	Input, output	
Rescaler0Out	Input	
Delayer0In	Input, output	
Delayer0Out	Input	
Event0	Input, output	
Event1	Input, output	
Event2	Input, output	
Event3	Input, output	
ActionTrig0	Input	
ActionTrig1	Input	

Chapter 6

Installing the eBUS SDK

This chapter describes how to install the eBUS SDK, and also provides information about installing the required driver.

Before you can configure and control your external frame grabber, you must ensure that the eBUS SDK and GigE Vision driver are installed on your computer.

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 external frame grabber. Consult the *eBUS Player Quick Start Guide* or *eBUS Player User Guide* for information about setting up and configuring your camera for connection to the external frame grabber.

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 external frame grabber using other GenICam compliant software, however, this guide provides you with the instructions you need to use the Pleora eBUS Player application.

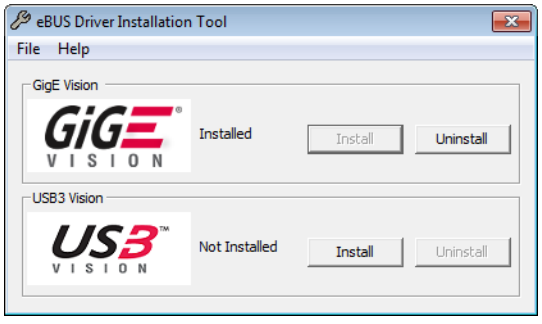
Installing the Driver and Configuring the NIC

Before you can configure the external frame grabber, use the Driver Installation Tool (included with the eBUS SDK) to install the correct driver. Then, set up your NIC.

The USB3 Vision driver is installed by default during the eBUS SDK installation process. You can also manually install and uninstall this driver using the eBUS Driver Installation Tool. The driver must be installed before you can use eBUS Player, or any 3rd party SDK software to configure the external frame grabber. If the USB3 Vision driver is not installed, the software will not detect the external frame grabber.

To install a Pleora driver

1. Click **Start** > **All Programs** > **eBUS** > **eBUS Driver Installation Tool**.
2. Under **GigE Vision**, click **Install**.
   The GigE Vision driver is installed across all network adapters on your computer.



3. Close the eBUS Driver Installation Tool.

You may be required to restart your computer.

To see the versions of the installed drivers, click **Help** > **About**.

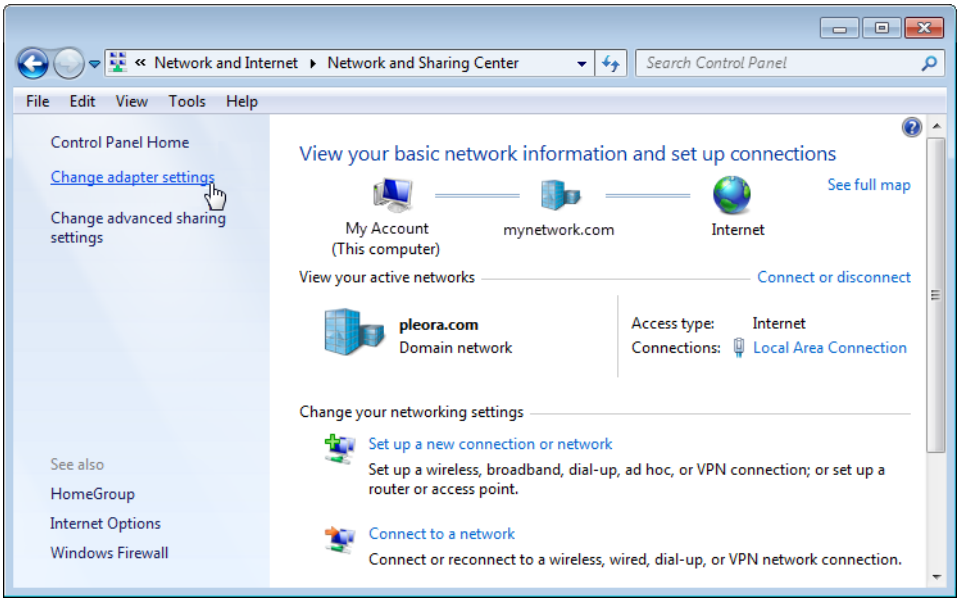
To configure an IP address for the NIC

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

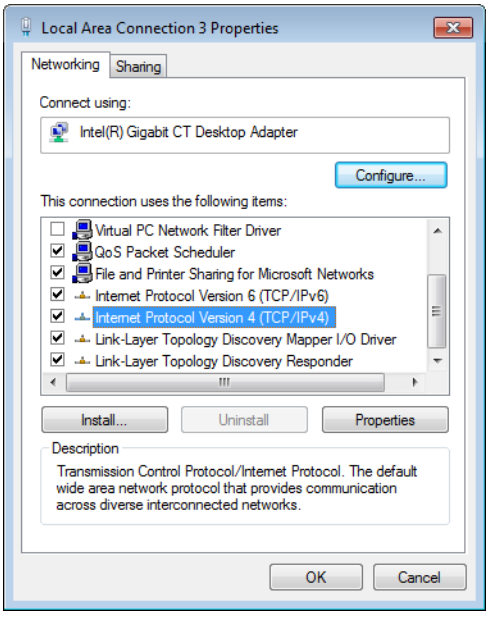
The instructions in this procedure are based on the Windows 7 operating system. The steps may vary depending on your computer's operating system.

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

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

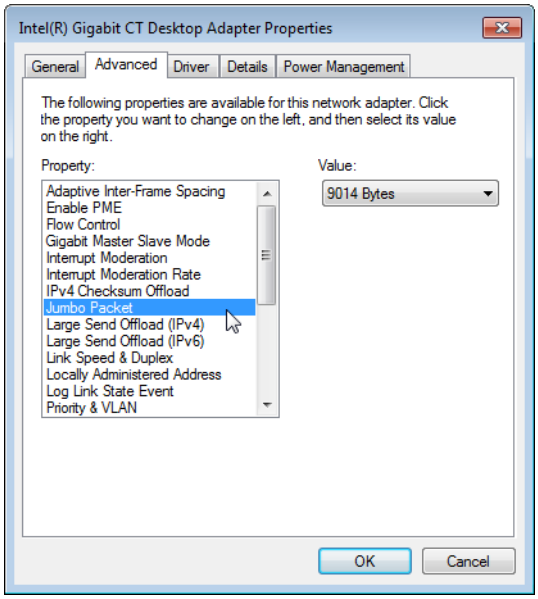


4. Right-click the NIC and then click **Properties**.
5. Click **Internet Protocol Version 4 (TCP/IPv4)** and then click **Properties**.



6. Select **Obtain an IP address automatically** or **Use the following IP address** to give the NIC an IP address.
7. Close the open dialog boxes to apply the changes and close the Control Panel.
8. Configure the NIC for jumbo packets (more often referred to as jumbo frames) and set the NIC's Rx Descriptor to the maximum available value. 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.

Chapter 7

Connecting to the External Frame Grabber and Configuring General Settings

After you have connected and applied power to the hardware components, use eBUS Player to configure the external frame grabber's general settings. You can provide it with a unique IP address on your network. Then you can configure its image and Camera Link settings to ensure images are received and displayed properly. You can also configure the buffer options to reduce the likelihood of lost packets.

eBUS Player is documented in more detail in the *eBUS Player Quick Start Guide* and the *eBUS Player User Guide*. The *iPORT CL-Ten External Frame Grabber User Guide* provides you with the eBUS Player instructions and overviews required to set up and configure the external frame grabber.

The following topics are covered in this chapter:

Connecting the Ethernet Cables and Confirming Image Streaming

The external frame grabber can communicate with your computer using either a direct connection or by connecting to a 10 GigE switch. This section explains how to connect the external frame grabber to a 10 GigE switch to confirm that images are streaming.

To connect the Ethernet cables and apply power

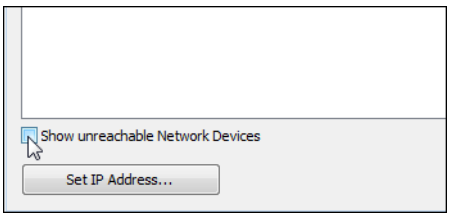
1. Connect the external frame grabber to your computer's NIC or a GigE switch.
2. Apply power.

When using PoCL with two Camera Link cables, ensure to plug in both cables before applying power to the device. If a device is powered before you plug in one cable, and then the other cable, the external frame grabber might not enable power to the second cable.

To start eBUS Player and connect to a device

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

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



3. In the **Device Selection** dialog box, click the external frame grabber.

If the IP address is not valid, a warning ( ) appears in the **Device Selection** dialog box. Provide the device with an IP address, as outlined in "Providing the External Frame Grabber with an IP Address" on page 34.

4. Click **OK**.

   eBUS Player is now connected to the device.

To confirm image streaming

1. Under **Acquisition Control**, click the source to which a camera is connected.
2. Click **Play** to stream live images.
3. After you confirm that images are streaming, click **Stop**.

If images do not stream, see the tips provided in "System Troubleshooting" on page 59.

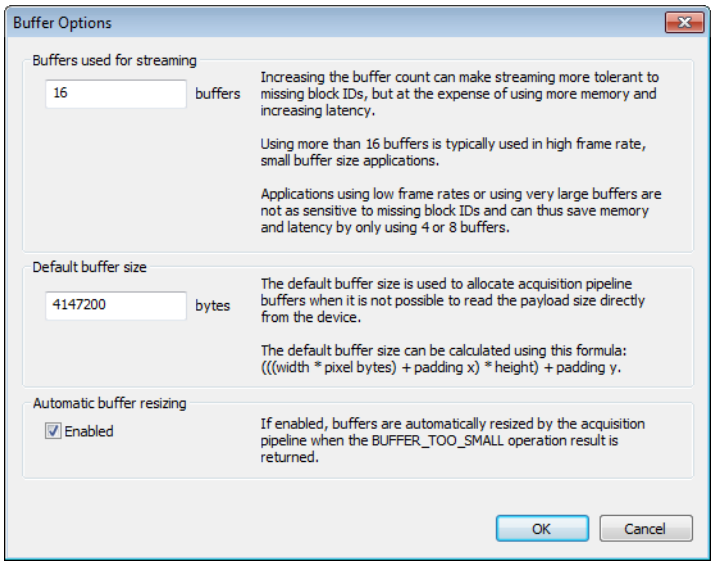
Configuring the Buffers

You can increase the buffer count using eBUS Player to reduce the impact and likelihood 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 eBUS Player and connect to the external frame grabber.
   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. Click **Tools** > **Buffer Options**.
3. Click the buffer option that suits your requirements.
4. Click **OK**.

Default size for streaming is 16 buffers.



Providing the External Frame Grabber with an IP Address

The external frame grabber 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 external frame grabber with an IP address

1. Start eBUS Player.
2. Click **Select/Connect**.
3. Click the external frame grabber.
4. Click **Set IP Address**.
5. Provide the external frame grabber with a valid IP address and subnet mask. You can optionally provide a default gateway.
6. Click **OK** to close the **Set IP Address** dialog box.
7. Click **OK** to close the **Device Selection** dialog box and connect to the device.

Configuring an Automatic/Persistent IP Address

The Device Control dialog box allows you to configure a persistent IP address for the external frame grabber. Alternatively, the external frame grabber can be configured to automatically obtain an IP address using Dynamic Host Configuration Protocol (DHCP) or Link Local Addressing (LLA). The external frame grabber 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 eBUS Player and connect to the external frame grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. Under **Parameters and Controls**, click **Device control**.
3. Under **TransportLayerControl**, 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 external frame grabber.

To automatically configure an IP address

1. Start eBUS Player and connect to the external frame grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. Under **Parameters and Controls**, click **Device control**.
3. Under **TransportLayerControl**, 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 external frame grabber.

Configuring the External Frame Grabber's Image Settings

You can configure the external frame grabber's image settings, which provide the external frame grabber with information about the image coming from the camera. These settings allow the images to appear correctly.

The image settings are located under **ImageFormatControl** in the **Device Control** dialog box.

For information about configuring the external frame grabber to send serial commands to a Camera Link camera that uses a CLProtocol DLL, see the *Establishing a Serial Bridge eBUS SDK Application Note* available on the Pleora Technologies Support Center.

To turn the test pattern on or off

1. Start eBUS Player and connect to the external frame grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. Under **Parameters and Controls**, click **Device control**.
3. Under **ImageFormatControl**, click a test pattern option in the list.
4. Close the **Device Control** dialog box.

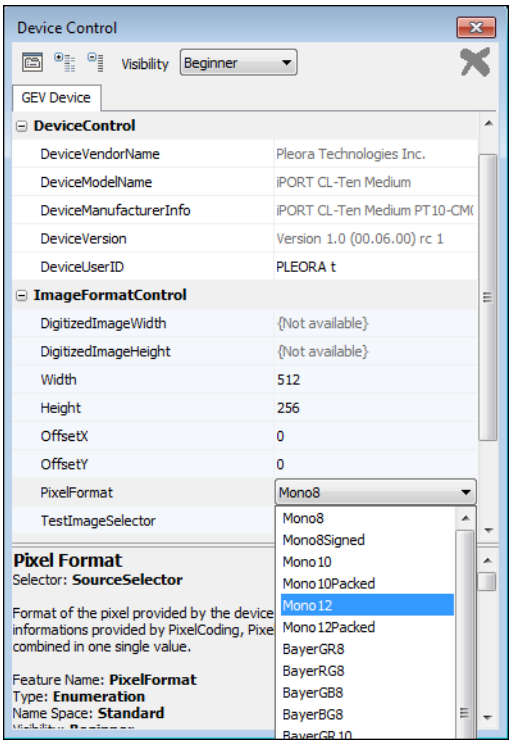
The external frame grabber test pattern can generate data rates that exceed Camera Link Full or Dual Medium data rates. This is expected behaviour; the test pattern is designed to stress the communications link.

To change the pixel format

1. Start eBUS Player and connect to the external frame grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. If images are streaming, click the **Stop** button.
3. Under **Parameters and Controls**, click **Device control**.
4. Under **SourceControl**, click the source that you want to configure.

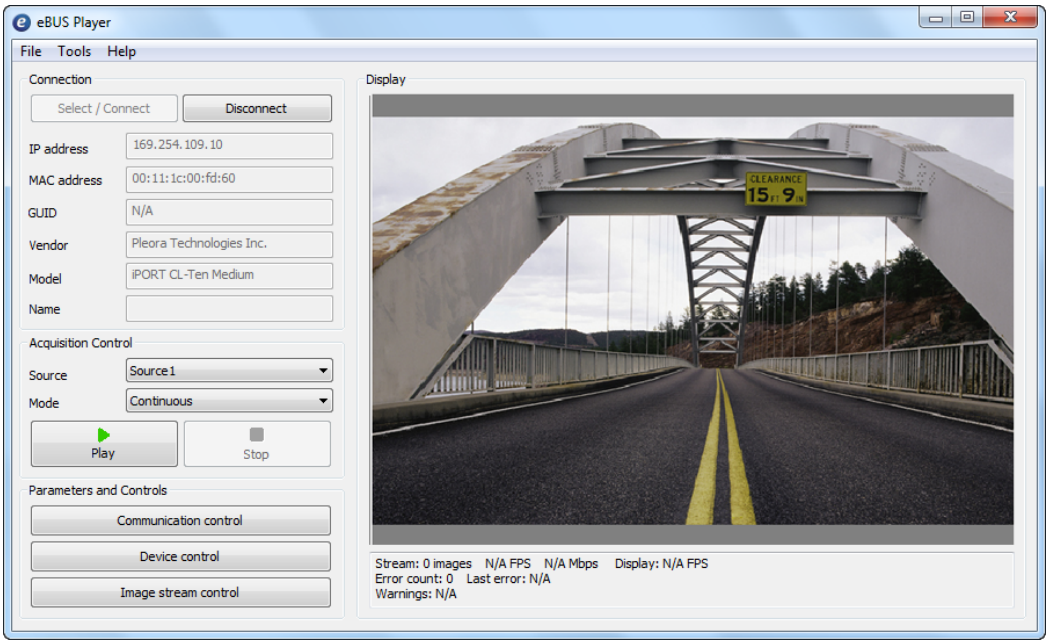
5. Under **ImageFormatControl**, set the **PixelFormat** feature to a color format.



Changes to the **PixelFormat** may affect the **DeviceScanType**, **SensorDigitizationTaps**, **DeviceTapGeometry**, **Width**, **Height**, **DigitizedImageWidth**, and **DigitizedImageHeight** features. When you change the PixelFormat, the external frame grabber may automatically adjust the other values to ensure the configuration is valid. For information about these settings, see "Configuring Camera Link Settings" on page 39.

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

7. Under **Acquisition Control**, click the source to which the camera you want to view is connected.
8. Click **Play** to see the changes.



To configure the image width and height

1. Start eBUS Player and connect to the external frame grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. If images are streaming, click the **Stop** button.
3. Under **Parameters and Controls**, click **Device control**.
4. Under **SourceControl**, click the source that you want to configure.
5. Under **ImageFormatControl**, change the **Width** and **Height** to suit your camera.
   - If the external frame grabber does not perform tap reconstruction (as specified in Table 15 on page 41), configure the **Width** and **Height**.
   - If the external frame grabber does perform tap reconstruction, configure the **Width**, **Height**, **DigitizedImageWidth**, and **DigitizedImageHeight**.

Changes to the **Width**, **Height**, **DigitizedImageWidth**, and **DigitizedImageHeight** may affect the **DeviceScanType**, **SensorDigitizationTaps**, **DeviceTapGeometry**, and **PixelFormat** features. When you change these features, the external frame grabber may automatically adjust the other values to ensure the configuration is valid. For information about these settings, see "Configuring Camera Link Settings" on page 39.

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

Configuring a Camera Link Camera

To configure a Camera Link camera, you can use one of the methods outlined in the following table.

Table 13: Connection Methods for Configuring Camera Link Cameras

Connection method	Use this method when...
Direct serial connection	You want to manually type commands that are directly sent to the camera. This method uses the **Serial Communications** dialog box in eBUS Player.
Serial Communication Bridge, Camera Link serial DLL connection	You are using a third-party camera configuration application that requires that you use a Camera Link serial DLL to send serial commands to the camera.
Serial Communication Bridge, CLProtocol DLL , and GenICam CLProtocol connection	The camera manufacturer has provided a CLProtocol DLL that allows you to configure and monitor settings within the camera using GenICam.

For more information about the Serial Communication Bridge methods, see the *Establishing a Serial Bridge Application Note* available on the Pleora Support Center.

Configuring Camera Link Settings

The CL-Ten Dual Medium External Frame Grabber supports up to two Camera Link Base or Medium cameras, which stream image data to the external frame grabber using four standard Camera Link cables, two cables for each camera (as outlined by the Camera Link standard).

If you are using Camera Link Base cameras, you can connect two Camera Link Base cameras to the CL-Ten Dual Medium External Frame Grabber using the **Medium 1A** and **Medium 2A** connectors.

The CL-Ten Full External Frame Grabber supports one Camera Link Medium, Full, or 80-bit camera, which streams image data to the external frame grabber using two standard Camera Link cables (as outlined by the Camera Link standard).

If you are using a Camera Link Base camera, you can connect it to the CL-Ten Full External Frame Grabber using the **Full A** connector.

To ensure images are received properly, you must configure the general Camera Link settings, which include specifying the sensor scan type (areascan or linescan), selecting the number of taps for your camera, and selecting your camera's tap geometry. All of this information is provided by the camera manufacturer.

Optionally, the external frame grabber can supply power to the camera using PoCL. Or, you can enable the SafePower protocol, which prevents the external frame grabber from attempting to supply power to a non-PoCL cable or camera.

Supported Camera Link Modes

The following table lists the supported Camera Link modes and sub-modes. All Camera Link Medium modes are supported, with the exception of the 3-tap modes. For detailed information about bit assignment for each mode, see the Camera Link standard (available from the Automated Imaging Association (AIA) at www.visiononline.org).

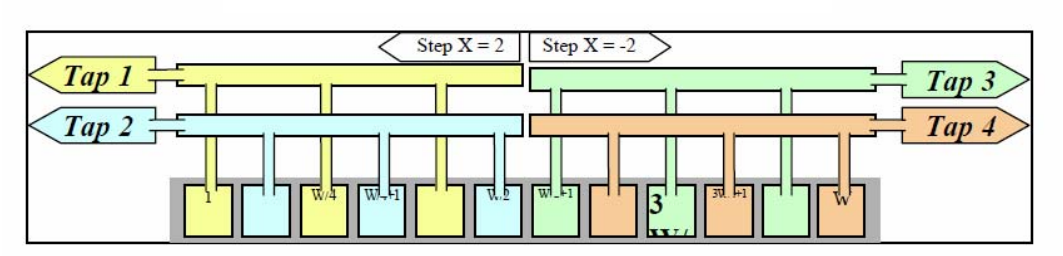
Table 14: Supported Camera Link Modes

Camera Link configuration	Taps	Pixel depth
Base	1	8-bit, 10-bit, 12-bit, 14-bit, 16-bit, 24-bit RGB
	2	8-bit, 10-bit, 12-bit
Medium	1	30-bit RGB, 32-bit RGBA, 36-bit RGB
	4	8-bit, 10-bit, 12-bit
Full (CL-Ten Full model only)	8	8-bit
80-bit (CL-Ten Full model only)	8	10-bit
	10	8-bit

About Tap Reconstruction

For multi-tap cameras, pixels may not be received in order from the Camera Link camera, depending on the camera's tap configuration. Using the DeviceTapGeometry GenICam feature, you can specify the device tap geometry that corresponds to your camera, which allows the external frame grabber to reconstruct the pixel order. The following figure provides an example of a tap geometry that requires reconstruction.

Figure 1: 2X2E (Linescan) Tap Geometry



When you select a tap geometry for which the external frame grabber performs tap reconstruction, you must provide the external frame grabber with information about the size of the image coming from the camera. This information allows the external frame grabber to send a portion of the image (an area of interest) to the receiver, when required.

Supported Device Tap Geometries

The following table lists the supported device tap geometries. Please note that the external frame grabber does not need to perform tap reconstruction for most of the supported tap geometries (that is, the taps are received in order from the camera and the external frame grabber does not need to reconstruct the order).

Table 15: Supported Camera Link Tap Geometries

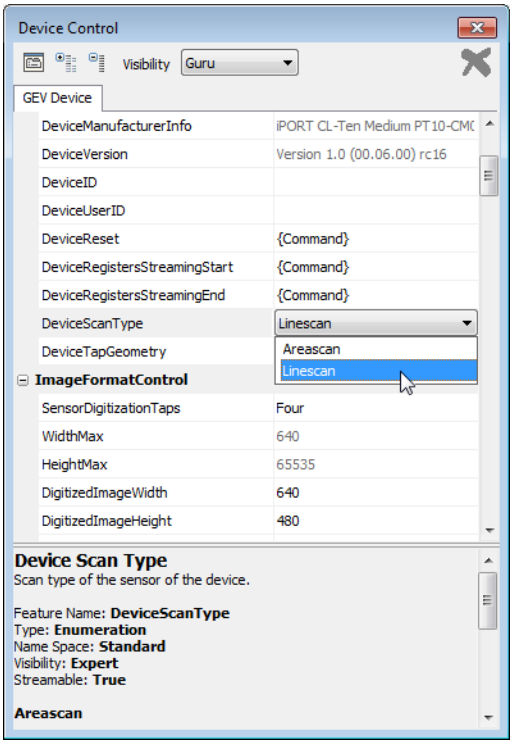
Tap geometry	Number of taps	Tap reconstruction performed?	Scan type
Geometry_1X_1Y	1	Not required	Areascan
Geometry_1X	1	Not required	Linescan
Geometry_1X2_1Y	2	Not required	Areascan
Geometry_1X2	2	Not required	Linescan
Geometry_1X4_1Y	4	Not required	Areascan
Geometry_1X4	4	Not required	Linescan
*Geometry_1X8_1Y	8	Not required	Areascan
*Geometry_1X8	8	Not required	Linescan
*Geometry_1X10_1Y	10	Not required	Areascan
*Geometry_1X10	10	Not required	Linescan
Geometry_2X2E	4	Yes	Linescan

* This tap geometry is only supported by the CL-Ten Full External Frame Grabber.

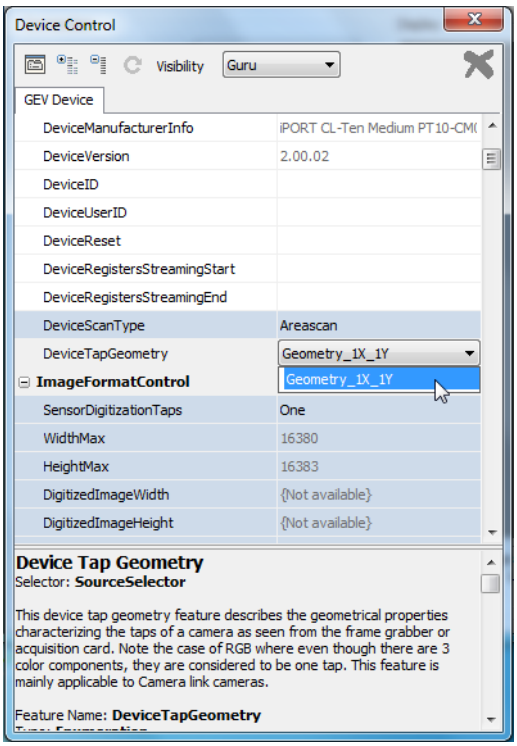
If your camera outputs a tap geometry that is not listed in this guide, you may need to perform tap reconstruction using your software application. For more information about tap geometry, refer to the *GenICam Standard Features Naming Convention* (Version 1.5.1 or later), available from the European Machine Vision Association at http://www.emva.org.

To configure general Camera Link settings

1. Start eBUS Player and connect to the external frame grabber.
   For more information, see "To start eBUS Player and connect to a device" on page 32.
2. If images are streaming, click the **Stop** button.
3. Under **Parameters and Controls**, click **Device control**.
4. Click **Expert** in the **Visibility** list.
5. Under **DeviceControl**, select a sensor scan type (areascan or linescan) in the **DeviceScanType** list.



6. Under **ImageFormatControl**, select the number of taps in the **SensorDigitizationTaps** list.
7. Under **DeviceControl**, select your camera's tap geometry in the **DeviceTapGeometry** list.



DeviceScanType, **SensorDigitizationTaps**, and **DeviceTapGeometry** are interrelated. When you change any of these values, the external frame grabber may automatically adjust the other values to ensure the configuration is valid.

These values are also affected by changes to the **Width**, **Height**, **DigitizedImageWidth**, **DigitizedImageHeight**, **SourceCount**, and **PixelFormat** features.

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

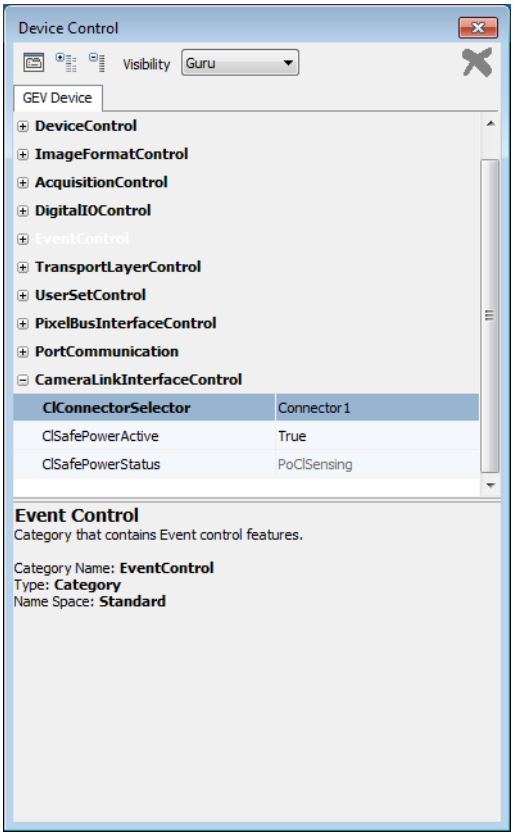
To configure the Camera Link SafePower settings

1. Under **CameraLinkInterfaceControl**, select the connector that you want to configure for SafePower in the **ClConnectorSelector** list.

For the CL-Ten Dual Medium External Frame Grabber, **Connector 1**, **Connector 2**, **Connector 3**, and **Connector 4** correspond to the **Medium 1A**, **Medium 1B**, **Medium 2A**, and **Medium 2B** connectors, respectively.

For the CL-Ten Full External Frame Grabber, **Connector1** and **Connector2** correspond to the **Full A** and **Full B** connectors, respectively.

2. To enable SafePower, set **ClSafePowerActive** to **True**. When this option is set to **False**, SafePower is disabled and the external frame grabber does not attempt to supply power to the selected connector.



3. Repeat steps 1 and 2 as required for the other connectors.
4. Close the **Device Control** dialog box.

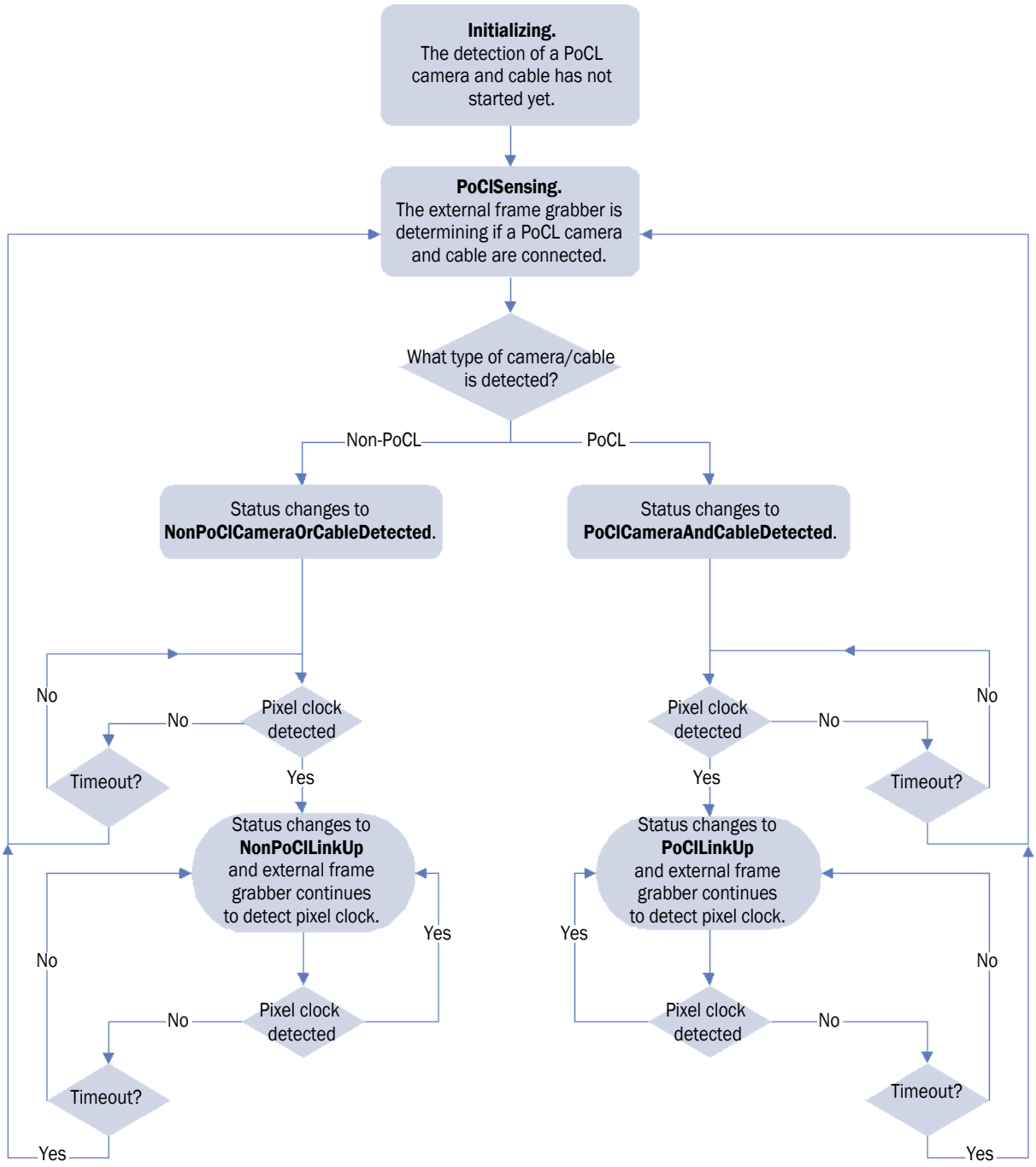
To view the Camera Link SafePower status

1. Under **CameraLinkInterfaceControl**, select a connector in the **ClConnectorSelector** list.

For the CL-Ten Dual Medium External Frame Grabber, **Connector 1**, **Connector 2**, **Connector 3**, and **Connector 4** correspond to the **Medium 1A**, **Medium 1B**, **Medium 2A**, and **Medium 2B** connectors, respectively.

For the CL-Ten Full External Frame Grabber, **Connector1** and **Connector2** correspond to the **Full A** and **Full B** connectors, respectively.

2. Review the status that appears under **ClSafePowerStatus**. The following flowchart explains the status changes. Please note that each connector performs this process independently.



Implementing the eBUS SDK

You can create your own image acquisition software for the external frame grabber. Consult the *eBUS SDK Programmer's Guide*, the *eBUS SDK C++ API Help file,* the *eBUS SDK .NET API Help file, the eBUS SDK C++ API Quick Start Guide, and the eBUS SDK .NET Quick Start Guide* for information about creating custom image acquisition software.

Chapter 8

Network Configurations

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

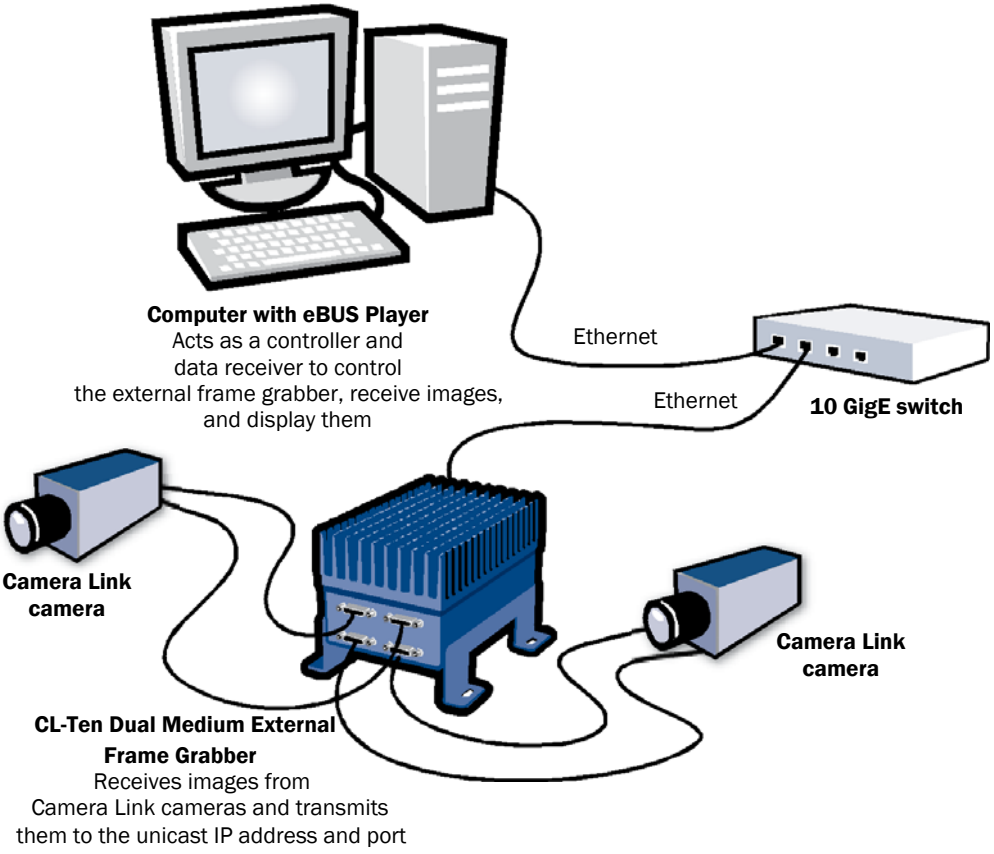
The following topics are covered in this chapter:

Unicast Network Configuration

In a unicast configuration, an external frame grabber is connected to a 10 GigE switch that sends a stream of images over Ethernet to the computer. Alternatively, the external frame grabber 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 external frame grabber.

Figure 2: Unicast Network Configuration



Required Items — Unicast Network Configuration

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

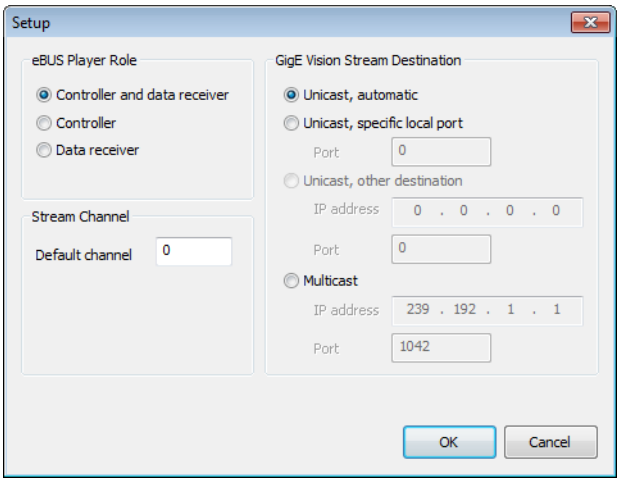
- iPORT CL-Ten External Frame Grabber and corresponding power supply
- Fiber cable with SFP connectors (quantity: 1)
- 10 GigE switch and an additional fiber cable (optional)
- Desktop computer with eBUS SDK installed
- Camera and cables

External Frame Grabber Configuration — Unicast Network Configuration

After you have connected and applied power to the hardware components, use eBUS Player to configure the external frame grabber.

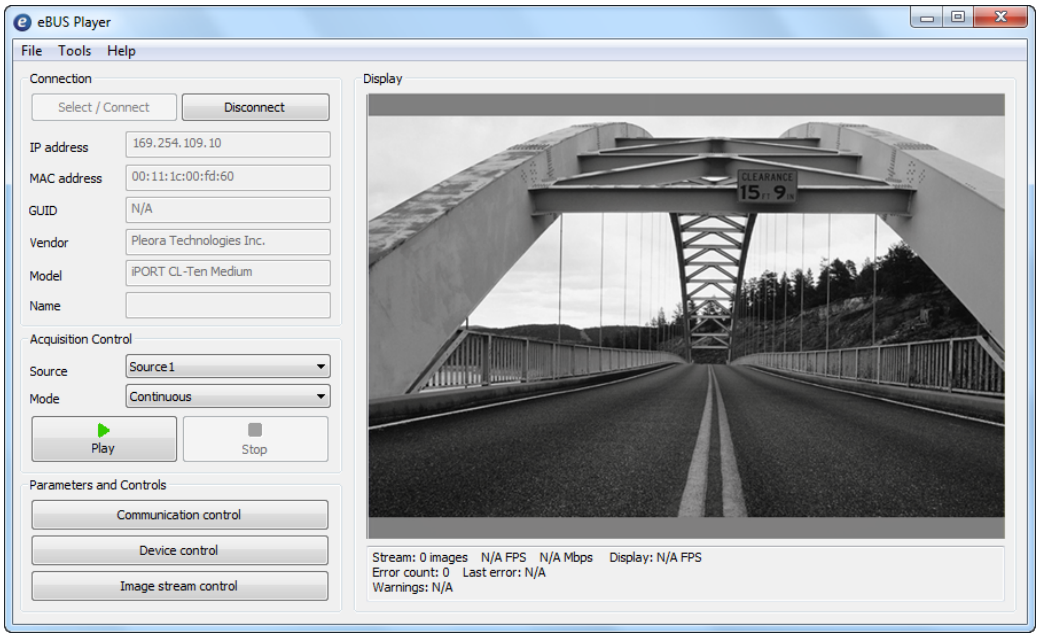
To configure the external frame grabber for a unicast network configuration

1. Start **eBUS Player**.
2. Click **Tools > Setup**.
3. Under **eBUS Player Role**, click **Controller and data receiver**.



4. Under **GigE Vision Stream Destination**, click **Unicast, automatic**.
5. Click **OK**.
6. Connect to the external frame grabber.

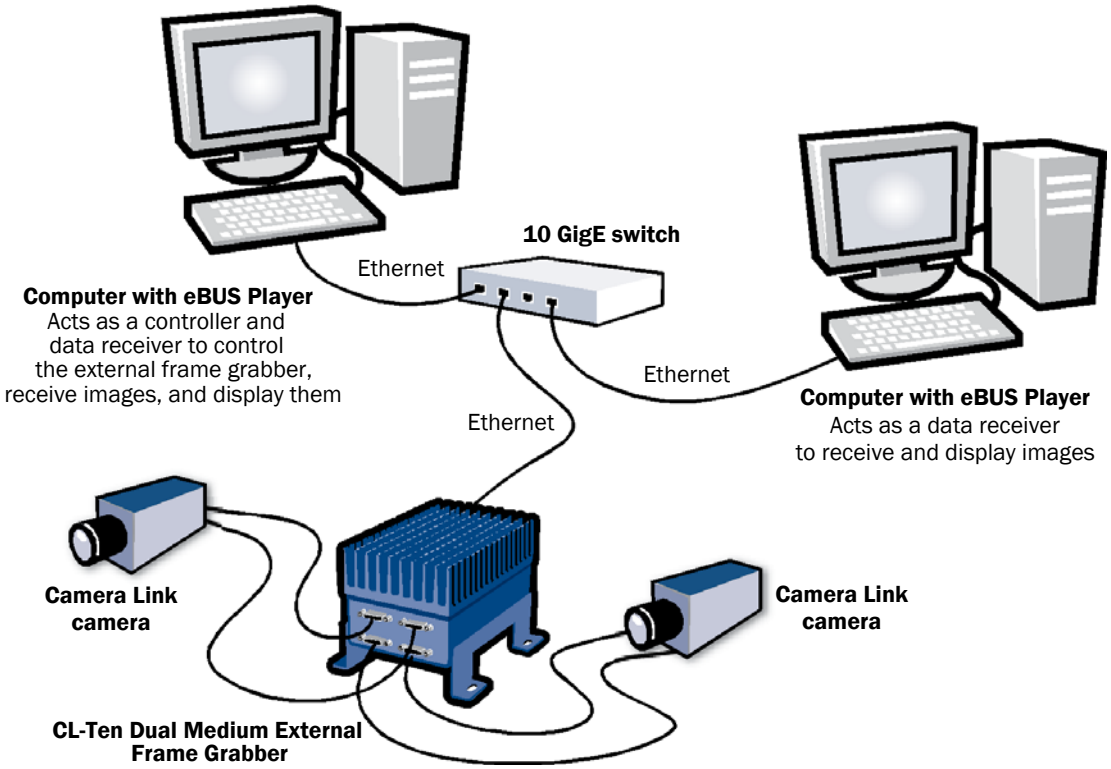
   For more information, see "To start eBUS Player and connect to a device" on page 32.
7. Click **Play** to view a live image stream.


eBUS Player
File Tools Help
Connection
Select / Connect
Disconnect
IP address
169.254.109.10
MAC address
00:11:1c:00:fd:60
GUID
N/A
Vendor
Pleora Technologies Inc.
Model
iPORT CL-Ten Medium
Name
Acquisition Control
Source
Source1
Mode
Continuous
Play
Stop
Parameters and Controls
Communication control
Device control
Image stream control
Display
CLEARANCE
15 FT 9 IN
Stream: 0 images N/A FPS N/A Mbps Display: N/A FPS
Error count: 0 Last error: N/A
Warnings: N/A

Multicast Network Configuration

In a multicast network configuration, the iPORT CL-Ten Dual Medium External Frame Grabber is connected to a 10 GigE switch, and sends a stream of images over Ethernet simultaneously to two computers running eBUS Player (or an application created with the eBUS SDK).

Figure 3: Multicast Network Configuration



Required Items — Multicast Network Configuration

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

- iPORT CL-Ten External Frame Grabber and corresponding power supply
- Fiber cable with SFP connectors (quantity: 3)
- 10 GigE switch (IGMP v2-compatible)
- Desktop computer (quantity: 2) with eBUS SDK installed
- Camera and cables

Connecting the Hardware and Power

The following procedure explains how to connect the power, network, and data cables to the computers running eBUS Player and to the CL-Ten External Frame Grabber.

To connect the network cables and apply power

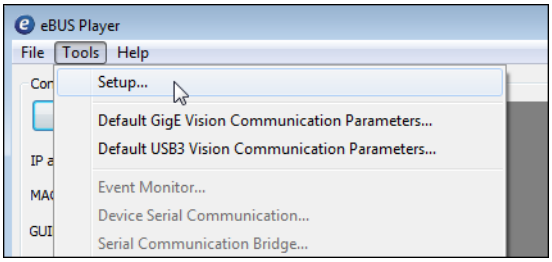
1. On the computer that is acting as a controller and data receiver with eBUS Player, connect a 10 GigE port on your NIC to a 10 GigE port on your 10 GigE switch. Repeat this step for the computer that is acting as a video receiver with eBUS Player.
2. Insert a fiber SFP+ module into the SFP+ Ethernet connector on the external frame grabber and connect the fiber cable to the module. Attach the other end to an available 10 GigE port on the 10 GigE switch.
3. Apply power to the devices.

Configuring the CL-Ten External Frame Grabber for a Multicast Network Configuration

After you have connected and applied power to the hardware components, use eBUS Player to configure the iPORT CL-Ten External Frame Grabber for multicast configuration. Begin by configuring one instance of eBUS Player to act as a data receiver. Then, configure the external frame grabber to transmit images to a multicast IP address and port.

To configure eBUS Player as a data receiver

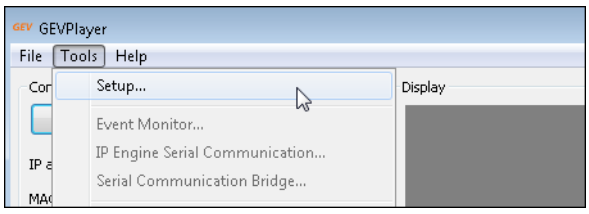
1. On the computer that is acting as a data receiver with eBUS Player, start **eBUS Player**.
2. Click **Tools > Setup**.



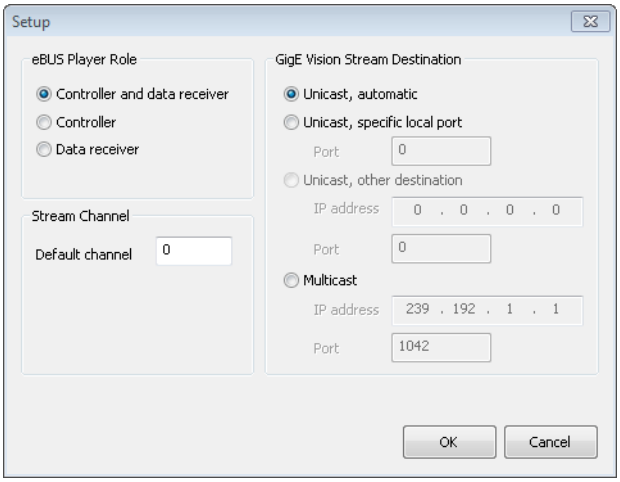
3. Under **eBUS Player Role**, click **Data receiver**.
4. Under **Stream Destination**, click **Multicast** and then specify a multicast address (for example, 239.192.1.1) and a streaming channel port (for example, 1042).
5. Click **OK**.
6. Now, configure the iPORT CL-Ten External Frame Grabber, as outlined in "To configure the iPORT CL-Ten External Frame Grabber for a multicast network configuration" on page 55.

To configure the iPORT CL-Ten External Frame Grabber for a multicast network configuration

1. On the computer that is acting as a controller and data receiver with eBUS Player, start eBUS Player.
2. Click **Tools > Setup**.



3. Under **eBUS Player Role**, click **Controller and data receiver**.



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

   The address and port must be identical to that configured for the receiver in step 4 of "To configure eBUS Player as a data receiver" on page 55.

5. Click **OK**.

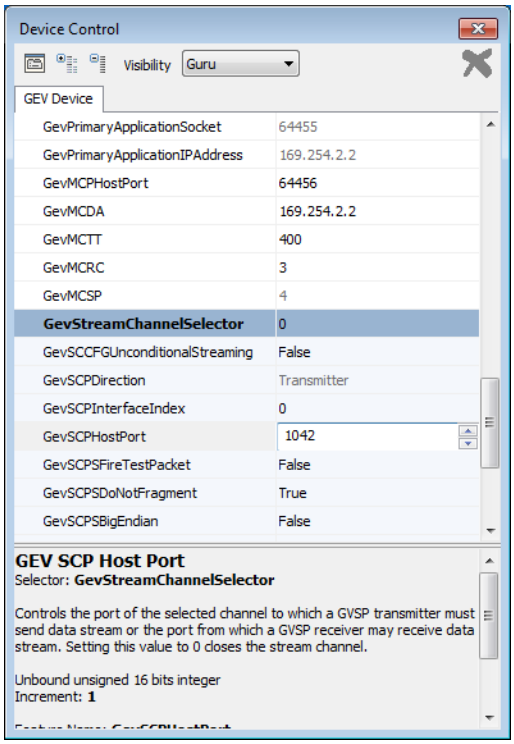
6. Connect to the iPORT CL-Ten External Frame Grabber.

   For more information, see "To start eBUS Player and connect to a device" on page 32.

7. Under **Parameters and Controls**, click **Device control**.

8. Click **Guru** in the **Visibility** list.

9. Under **TransportLayerControl** > **GigEVision**, ensure that the port in the **GevSCPHostPort** field and the multicast IP address in the **GevSCDA** field are correct. They are configured automatically to the values set in step 4 of this procedure.



10. When you follow the instructions in this section, eBUS Player automatically configures the external frame grabber to send images from **Source1** to the default multicast group. To send images from a particular source to a specific multicast group, select the stream you want to configure in the **GevStreamChannelSelector**. Then, specify the multicast group information in the **GevSCPHostPort** and **GevSCDA** fields. In the **GevStreamChannelSelector**, **0** corresponds to **Source1** and **1** corresponds to **Source2**.

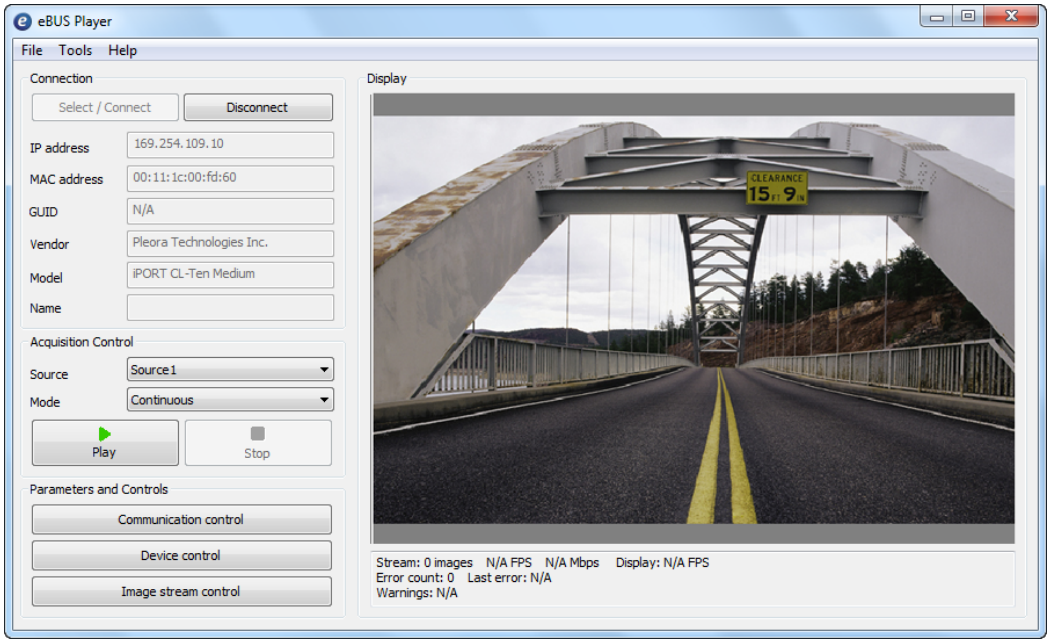
- **Source1** corresponds to the camera connected to the **Medium 1** connectors.
- **Source2** corresponds to the camera connected to the **Medium 2** connectors.

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

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

13. Click **Play** to view the source image stream on the computer.

The multicast image is shown on the receiver, as shown below.



Chapter 9

System Troubleshooting

This chapter provides you with troubleshooting tips and recommended solutions for issues that can occur during configuration, setup, and operation of the CL-Ten External Frame Grabber.

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 on the Pleora Technologies Support Center.

Refer to the product release notes that are available on 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 external frame grabber. 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 16: Troubleshooting Tips

Symptom	Possible cause	Resolution
SDK is able to connect, but no images appear in eBUS Player. In a multicast configuration, images appear on a display monitor connected to a vDisplay HDI-Pro External Frame Grabber but do not appear in eBUS Player.	In a multicast configuration, the external frame grabber may not be configured correctly	Images might not appear on the display if you have not configured the external frame grabber for a multicast network configuration. The external frame grabber and all multicast receivers (for example, a vDisplay HDI-Pro External Frame Grabber) must have identical values for both the **GevSCDA** and **GevSCPHostPort** features in the **TransportLayerControl** section. For more information, see "Multicast Network Configuration" on page 53.
	In a multicast configuration, your computer's firewall may be blocking eBUS Player	Ensure that eBUS Player is allowed to communicate through the firewall.
	Anti-virus software or firewalls blocking transmission	Images might not appear in eBUS Player because of anti-virus software or firewalls on your network. Disable all virus scanning software and firewalls, and re-attempt a connection to the external frame grabber with eBUS Player.
Dropped packets: eBUS Player, NetCommand, or applications created using the eBUS SDK	Insufficient computer performance	The computer being used to receive images from the device may not perform well enough to handle the data rate of the image stream. The GigE Vision 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 GigE Vision driver, a computer with better performance may be required.
	Insufficient NIC performance	The NIC being used to receive images from the device 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. For information about maximizing the performance of your system, see the *Configuring Your Computer and Network Adapters for Best Performance Application Note* available on the Pleora Support Center.

Table 16: Troubleshooting Tips (Continued)

Symptom	Possible cause	Resolution
Black bars appear on the sides of the images	Camera does not output images using the full image size	In eBUS Player, adjust the **Width**, **Height**, **DigitizedImageWidth**, **DigitizedImageHeight**, and image offset features until the black bars no longer appear.
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** feature	In eBUS Player, adjust the **Width**, **Height**, **DigitizedImageWidth**, **DigitizedImageHeight**, **OffsetX**, and **OffsetY** to the correct value, based on the **InputVideoFormat** settings that you configured.
Exclamation marks appear beside the **Width**, **Height**, **DigitizedImageWidth**, **DigitizedImageHeight**, **OffsetX**, or **OffsetY** features in eBUS Player		

Chapter 10

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:

CL-Ten Dual Medium External Frame Grabber Mechanical Drawings

The mechanical drawings in this section provide the CL-Ten Dual Medium External Frame Grabber's dimensions, features, and attributes. All dimensions are in millimeters.

Figure 4: CL-Ten Dual Medium External Frame Grabber Enclosure - Top View

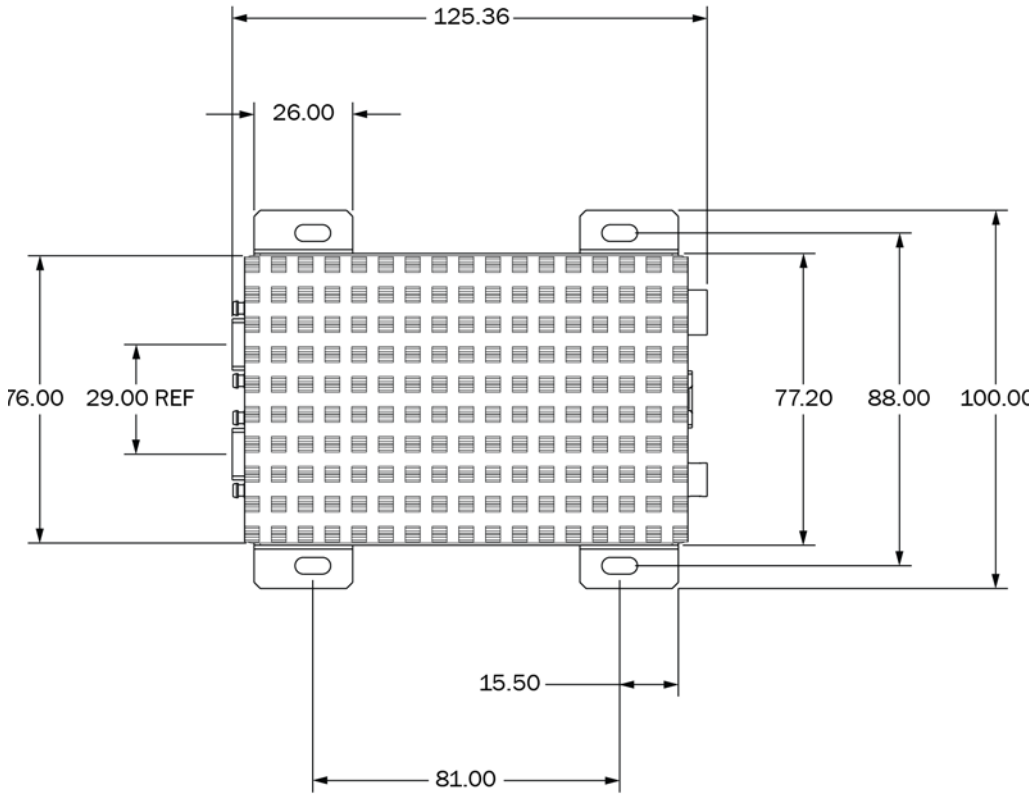


Figure 5: CL-Ten Dual Medium External Frame Grabber Enclosure - Side View

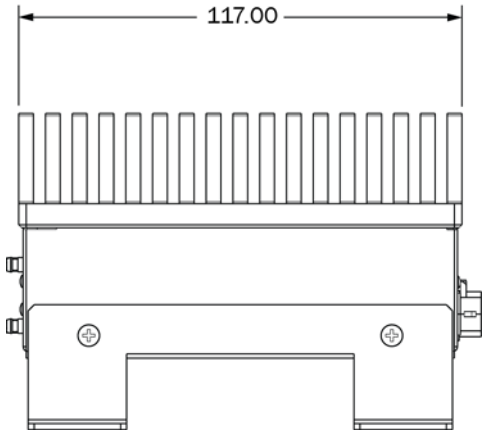


Figure 6: CL-Ten Dual Medium External Frame Grabber Enclosure - Back View

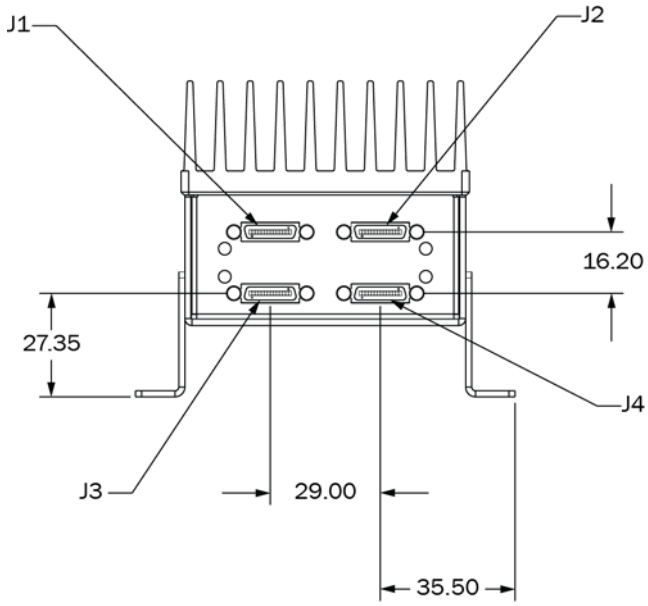
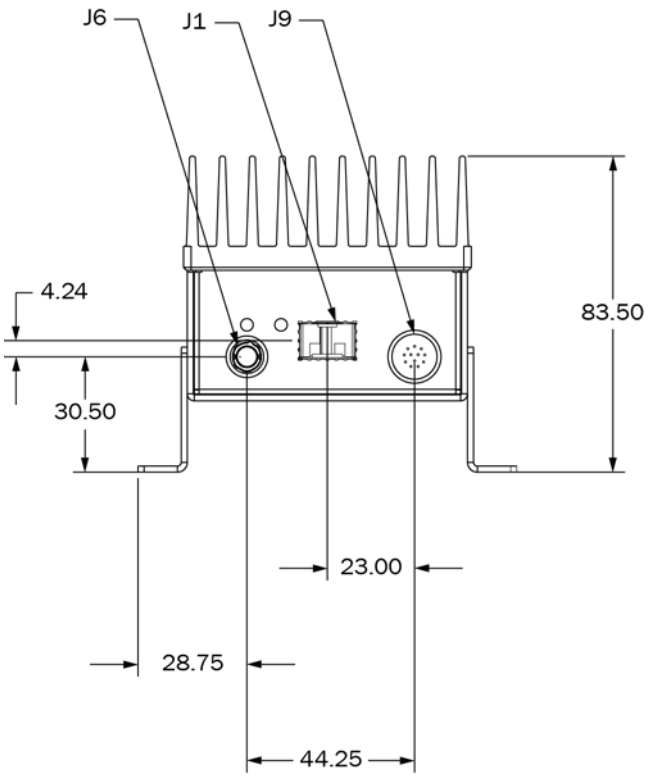


Figure 7: CL-Ten Dual Medium External Frame Grabber Enclosure - Front View



CL-Ten Full External Frame Grabber Mechanical Drawings

The mechanical drawings in this section provide the CL-Ten Full External Frame Grabber's dimensions, features, and attributes. All dimensions are in millimeters.

Figure 8: CL-Ten Full External Frame Grabber Enclosure - Top View

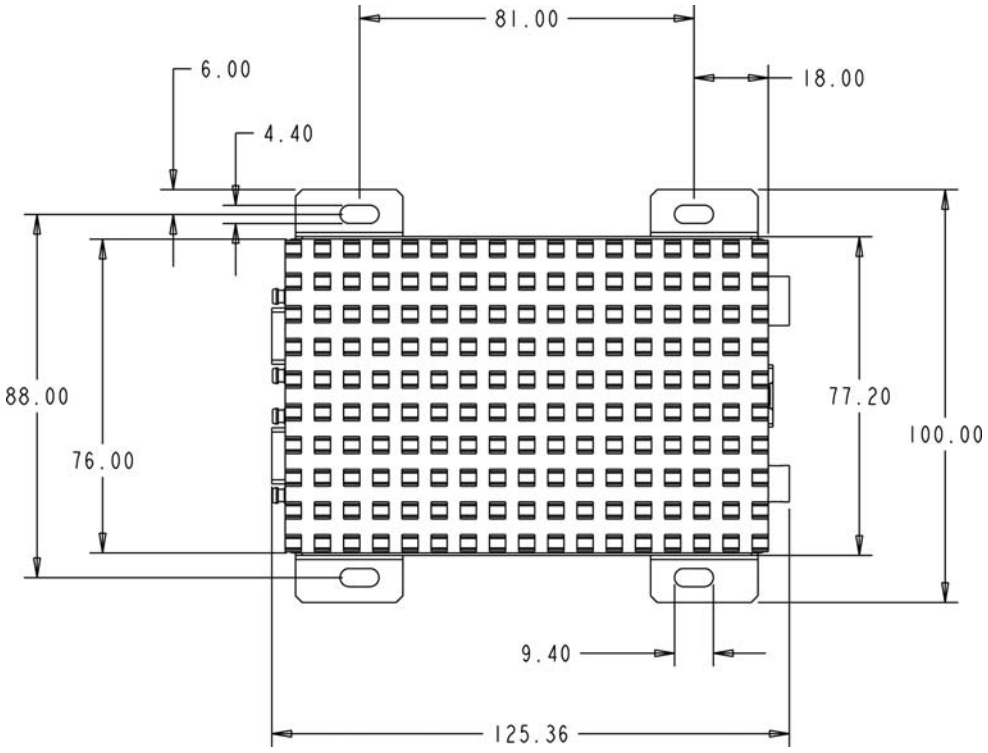


Figure 9: CL-Ten Full External Frame Grabber Enclosure - Side View

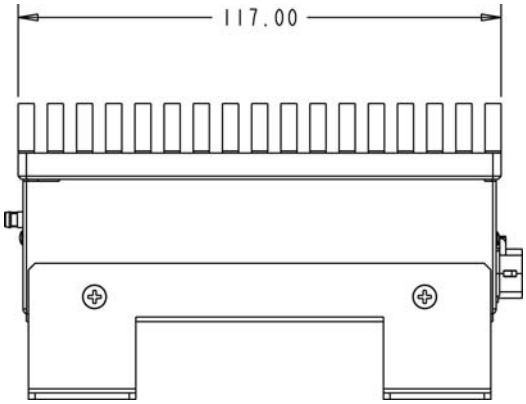


Figure 10: CL-Ten Full External Frame Grabber Enclosure - Back View

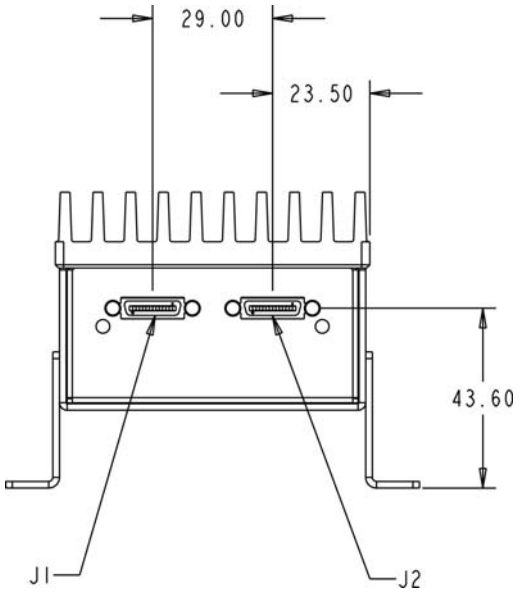
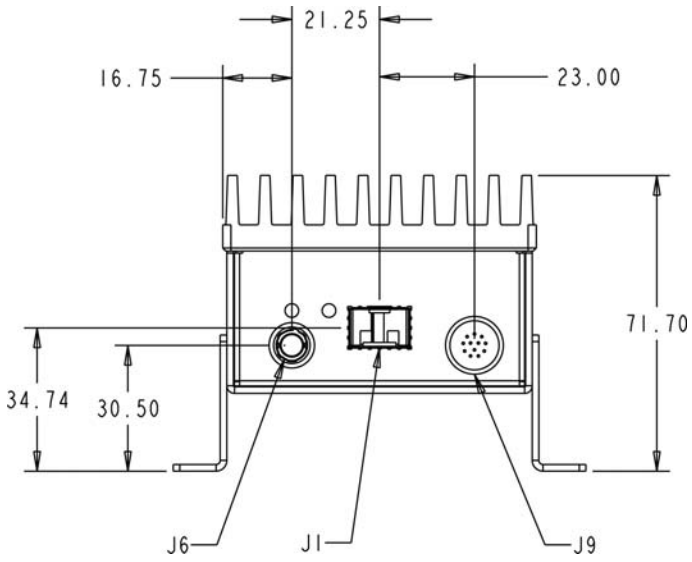


Figure 11: CL-Ten Full External Frame Grabber Enclosure - Front View



CL-Ten External Frame Grabber Material List

The connectors, and accessory and cable summaries summary details for the CL-Ten Dual Medium and Full External Frame Grabbers are listed is provided in the following table.

Table 17: Connector Summary

Description	Manufacturer part number	Manufacturer
6-pin circular connector, male	HR10A-7R-6P(73)	Hirose
12-pin circular connector, female	HR10A-10R-12SB(71)	Hirose
Camera Link SDR (Mini CL) connectors	12226-8250-00FR	3M
Accessories		
SFP+ module	Example: E10GSFPSR	Intel
10 GigE NIC	Example: E10G42BTDA	Intel

When purchasing fiber cables, ensure you purchase cables that are rated for 10GigE.

Source manufacturer, description, and identification may vary and are subject to change for each connector and accessory.

Chapter 11

Technical Support

On 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.