

# **iPORT** *Pure* **GEV** Quick Start Guide







GigE Vision made easy

Version 0.2

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# Getting started with the iPORT PureGEV Suite

The iPORT PureGEV Suite is a complete set of tools for configuring and controlling your GigE Visionenabled camera. GEVPlayer is a simple-yet-powerful program that lets you use your IP Engine to capture your first images quickly and easily. Then, as you familiarize yourself with GigE Vision, you can create your own application with the easy-to-use SDK.

The iPORT PureGEV Suite lets you quickly take your GigE Vision device from concept to prototype to finished product!

In this section:

Getting started	. 7
Going further	. 7

# **Getting started**

#### To acquire your first images using the iPORT PureGEV Suite:

- 1. Insert your software CD in your PC and install the following suites:
  - eBUS Driver Suite iPORT Vision Suite iPORT PureGEV Suite
- 2. Follow the directions in the *eBUS Quick Start Guide* to choose and install the NIC driver that best meets your needs. (The iPORT PureGEV Suite requires an eBUS driver.)
- 3. Cable your camera, IP Engine, and PC together. See "Cabling your camera to your PC" on page 13.
- 4. Configure the Windows XP Firewall. See "Configuring the Windows XP Firewall" on page 15.
- 5. Launch GEVPlayer. See "Launching GEVPlayer" on page 17.
- 6. Connect to your IP Engine. See "Connecting to your IP Engine" on page 19.
- 7. Acquire your first images. See "Acquiring images" on page 23.

### Going further...

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

- Configure and control your IP Engine further. See "Controlling your IP Engine" on page 25.
- Track the performance of your camera, IP Engine, and PC. See "Tracking performance" on page 29.
- Write your own program! See "Creating your own GigE Vision system" on page 31.

8 Getting started with the iPORT PureGEV Suite

# Understanding the iPORT PureGEV Suite

In this section:	
About IP Engines, cameras, and GEV devices	9
The birth of GigE Vision	10

# About IP Engines, cameras, and GEV devices

Though the iPORT PureGEV Suite is principally designed to support iPORT IP Engines (with GEV firmware), you can also use it to connect to and control third-party GEV devices. By necessity, the documentation distinguishes the IP Engine and the camera you're (typically) integrating.

However, the form factor of your IP Engine may vary. The form of your IP Engine could be a standalone IP Engine, a standalone IP Engine with a separate cable-connected camera, an IP Engine and camera integrated into a single physical unit, or a third-party GigE Vision compliant camera.



The iPORT PureGEV Suite lets you connect to *any* GigE Vision compliant device, regardless of its form!



### 10 Understanding the iPORT PureGEV Suite

# The birth of GigE Vision

Ideally, knowing how to set a parameter on one camera...



...would let you make the same setting for all cameras.



However, cameras have manufacturer-specific or model-specific instruction sets.



As a result, end users, programmers, or someone had to adapt for every camera they used.



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To reduce frustration, Pleora created camera-specific DLLs for as many models as they could (in the iPORT Vision Suite). These DLLs helped provide a more standard interface. Though the process was time-consuming (for Pleora), the DLLs worked well...



Recognizing that the increasing complexity of modern cameras would exacerbate end-user frustration (and that keeping all DLLs up-to-date was impossible), Pleora and a group of companies created the GigE Vision Standard. To be compliant, a GigE Vision device has to provide an XML file that defines its features and how to use them.



Using an iPORT IP Engine and a camera together, you can create a system that behaves as a single, GEV-compliant device. The IP Engine stores the XML file and provides it on request (as well as providing the required GEV interface).



# 12 Understanding the iPORT PureGEV Suite

# Cabling your camera to your PC

13

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

#### To cable your camera to your PC:

Cable your system as described in either "Dedicated connection" on page 13 or "Dedicated connection with a second regular NIC" on page 13. Power cables aren't shown.

### **Dedicated connection**

If you require a very high bandwidth connection to your IP Engine but don't require corporate network connectivity, use the configuration below.



This configuration might be used for a standalone machine vision system. For best performance, cable your IP Engine to an Intel PRO/1000 NIC. The Intel PRO/1000 NIC is reliable and lets you use the efficient eBUS Optimal Driver.

### Dedicated connection with a second regular NIC

If you intend to use your NIC as a dedicated connection to your camera, use the configuration below. In this configuration, you have a second NIC for corporate network connectivity.



# Switched connection (not recommended for first-time use)

If you intend to use a single NIC for both the connection to your camera and corporate network connectivity, use the configuration below.



If you're setting up your IP Engine for the first time, we advise against using this configuration. Such an arrangement may cause the following problems:

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

# **Configuring the Windows XP Firewall**

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

Follow the directions to ensure Windows XP Firewall works with GEVPlayer (or modify the directions for your own program). Finally, and only if you prefer, you can use the directions to disable the firewall completely.

#### To configure the Windows XP Firewall:

- From the Windows Start menu, select Start > Control Panel. The Control Panel appears.
- 2. Open the Windows Firewall.
- If the firewall is set to **Off** (such as for closed systems), no further changes are required.
- 3. On the General tab, allow exceptions (*Uncheck* Don't allow exceptions).
- 4. Select the **Exceptions** tab.
- 5. Click Add Program. The Add a Program dialog appears.
- 6. Select GEVPlayer and click OK (the default install location is C:\Program Files\Pleora Technologies Inc.\iPORT PureGEV Suite\Binaries\GEVPlayer.exe). The Add a Program dialog closes and GEVPlayer appears in the Programs and Services field.
- Click OK to close the Windows Firewall dialog. The Windows XP Firewall now allows GEVPlayer to send and receive network packets. You can now launch GEVPlayer. See "Launching GEVPlayer" on page 17.

# 16 Configuring the Windows XP Firewall

# Launching GEVPlayer

#### To launch GEVPlayer:

•

From the Windows Start menu, select Start > All Programs > Pleora Technologies Inc > iPORT **PureGEV Suite > GEVPlayer**.

The main page of GEVPlayer appears. You can now connect to your IP Engine. See "Connecting to your IP Engine" on page 19.

🔛 GEVPlayer			
File Tools He	lp		
Connection -		Display	
Select / C	Connect Disconnect		
IP address			
MAC address			
Manufacturer			
Model			
Name			
Acquisition Cor	ntrol		
Mode		×	
Channel	Data Channel #0	×	
Pla	y Stop		
Parameters an	d Controls		
	Communication control		
	GEV Device control		
	Image stream control		

### **Understanding GEVPlayer**

GEVPlayer consists of two parts — the control side and the display side.

The control side (on the left) lets you select and connect to an IP Engine, configure it, and acquire images. The display side (on the right) passively displays images from your IP Engine. 



right side - display

left side - control

# 18 Launching GEVPlayer

# **Connecting to your IP Engine**

#### To select and connect to your IP Engine:

1. Launch GEVPlayer. See "Launching GEVPlayer" on page 17.

🕮 GEVPlayer	
File Tools Help	
Connection	Display
Select / Connect Disconnect	
	- I I I I I I I I I I I I I I I I I I I
IP address	
MAC address	
Manufacturer	
Model	
Hanna	=
Ivalle	
Acquisition Control	
Mode	×
Channel Data Channel #0	×
F. 8	
Play Stop	
Parameters and Controls	$\equiv$
Communication control	
GEV Device control	
Image stream control	

- In the Connection pane, click Select / Connect. The GEV Device Selection dialog appears, listing the IP Engines that each NIC found. NICs connected to a switched network may find multiple IP Engines.
- In the Available IP Engines pane, select your IP Engine. GEVPlayer displays information about your selection in the IP Engine and NIC information pane.



### 20 Connecting to your IP Engine

- 4. Click OK.
  - The Set IP Engine IP Address dialog appears.

0 11	L			
t IP Engine I	P Addre	ess		
NIC Settings				
MAC Address	00 :	0E : 0C	: A2 : 3	8:4C
IP Address	192	168	. 101	. 22
Subnet Mask	255	255	. 255	. 0
Gateway	0	0	. 0	. 0
IP Engine Settir	ngs			
MAC Address	00 :	11 : 1C	: 00 : 2	9 : A1
IP Address	169	254	. 37	. 180
Subnet Mask	255	255	. 0	. 0
Gateway	0	0	. 0	. 0
Varnings				
Subnets don't ma	atch!			
	ĸ		Cancel	

- 5. In the IP Engine Settings pane, enter the IP Address, Subnet Mask, Gateway.
- 6. Click OK.

The Set IP Engine IP Address dialog closes.

GEV Device Selection	
Available IP Engines	IP Engine and NIC Information IP Engine Hardware Device Name: [not available] Model: PT1000-CL4 Serial Number: [not available] Device Information: GigE Vision Demo (0) Device Version: Version 1.0 (1.22)
	Device ID: 7     Module ID: 6.1     Vendor Id: 0     Firmware version: 1.22     IP Engine Settings     Protocol: GigE Vision version 1.00     MAC Address: 00:11:1C:00:29:A1     IP Address: 189 254 60 50
OK Can	- Subnet mask: 255 255.0.0 Gateway: [not available]

7. Click OK.

The **GEV Device Selection** dialog closes and GEVPlayer connects to your IP Engine. You can now acquire images. See "Acquiring images" on page 23.

🔛 GEVP layer		
File Tools Help	)	
Connection		Display
Select / Co	onnect Disconnect	
IP address	169.254.60.50	
MAC address	00:11:1C:00:29:A1	
Manufacturer	Pleora Technologies Inc.	
Model	PT1000-CL4	
Name	N/A	
Acquisition Con	trol	
Mode	Continuous	
Channel	Data Channel #0	
Play	Stop	
Parameters and	l Controls	
	Communication control	
	GEV Device control	
	Image stream control	

# 22 Connecting to your IP Engine

# **Acquiring images**

The Acquisition Control pane lets you easily access the features that control how you acquire images.

The GigE Vision Standard requires that your IP Engine start up in a state ready to send images. In fact, you can still acquire images even if you don't have a camera — iPORT IP Engines send a sawtooth-shaped test pattern by default.

#### To acquire images:

- 1. Select and connect to your IP Engine. See "Connecting to your IP Engine" on page 19.
- 2. In the Acquisition Control pane, select your preferred Mode and Channel. For continuous images, select Continuous and Data Channel #0. For other acquisition modes, see "Understanding acquisition modes" on page 23.
- In the Acquisition Control pane, click Play. The images appear in the Display pane. If you want to control the IP Engine further see "Controlling your IP Engine" on page 25.

🔛 GEVPlayer				
File Tools Help	)			
Connection		Display		
Select / Co	onnect Disconnect			
IP address	169.254.244.221			
MAC address	00(11)1C(00)29(A1			4
Manufacturer	Pleora Technologies Inc.			
Model	PT1000-CL4			
Name	N/A			
Acquisition Cont	trol			
Mode	Continuous			
Channel	Data Channel #0			
Play	Stop			
Parameters and	I Controls			
	Communication control			
	GEV Device control			
	Image stream control	690 images 161.7 FP5	397.5 Mbps	

# Understanding acquisition modes

Your IP Engine lets you acquire images continuously, or frame-by-frame. You can also save images to the IP Engine's onboard memory and retrieve them later. The IP Engine's acquisition modes include:

#### Continuous

Acquire images continuously.

#### ContinuousReadout

Acquire images continuously from the IP Engine's onboard memory (until all images in memory have been retrieved).

### 24 Acquiring images

#### ContinuousRecording

Save images to the IP Engine's onboard memory until its memory is full.

#### Multiframe

Acquire a fixed number of images. To configure the number of images, set the IP Engine's **AcquisitionFrameCount** feature.

#### SingleFrame

Acquire a single image.

#### SingleFrameReadout

Acquire a single image from the IP Engine's onboard memory.

#### SingleFrameRecording

Save a single image to the IP Engine's onboard memory.

# **Controlling your IP Engine**



GEVPlayer lets you control settings using three functionally identical dialogs.

#### **Control dialogs**

Dialog name	Button	Purpose
<b>Communication Control</b> dialog	Communication control	Controls network transport layer settings
GEV Device Control dialog	GEV Device control	Controls settings on the IP Engine and camera
Image Stream Control dialog	Image stream control	Controls image stream settings and provides performance statis- tics

#### To access the control dialogs:

 In the Parameters and Controls pane, click one of: GEV Device control, Communication control, or Image stream control. A control dialog appears.

# Understanding the control dialogs

#### To control the list of features in the left-hand pane:

- Expand and collapse the tree by clicking the + and icons.
- Find features alphabetically by using the alphabetization button  $\frac{2}{2}$ .

• To show all features, set Visibility to Guru; to hide complex features, set Visibility to Beginner.

#### To control features:

- 1. Select a feature in the left-hand column. Information about the feature appears in the bottom pane.
- 2. If the feature has an editable value, change the value in the edit window. The value is applied when you click somewhere else.



3. If the feature is a command, click it to make the button appear. Click the button to activate the command.

DecimationHorizontal	1	~	DecimationHorizontal	1	^
DecimationVertical	1		DecimationVertical	1	
PixelFormat	Mono8	=	PixelFormat	Mono8	
TestImageSelector	IPEngineTestPattern	_	TestImageSelector	IPEngineTestPattern	_
AcquisitionAndTriggerControls			AcquisitionAndTriggerControls		
AcquisitionMode	Continuous		AcquisitionMode	Continuous	
AcquisitionStart	{Command}		AcquisitionStart	AcquisitionStart	
AcquisitionStop	{Command}		AcquisitionStop	{Command}	
AcquisitionFrameCount	1		AcquisitionFrameCount	1	
CountersAndTimersControls			CountersAndTimersControls		
CounterSelector	Counter1		CounterSelector	Counter1	
CounterEventSource	Off		CounterEventSource	Off	
CounterDecrementEventSource	Off	~	CounterDecrementEventSource	Off	~

# Understanding the controls

All the IP Engine's features are parameter based. By changing the value of a feature, you can directly control how the IP Engine works. In fact, most of the information in GEVPlayer directly correlates to a parameter-based feature in the IP Engine.

# **Connection pane**

### Features in the Connection pane

Connection pane shortcut	IP Engine feature
IP address field	GigEVisionTransportLayer > GevCurrentIPAddress
MAC address field	GigEVisionTransportLayer > GevMACAddress
Manufacturer field	DeviceInformation > DeviceVendorName
Model field	DeviceInformation > DeviceModelName

🔛 GEVPlayer		GEV Device Control	GEV Device Control		
File Tools Help		2 Visibility Be	eginner 🔽 🦻		
Connection		DeviceInformation			
Select / Co	nnect Disconnect	DeviceVendorName	Pleora Technologies Inc.		
TD address	169.254.60.50	DeviceModelName	PT1000-CL4		
IP address		DeviceManufacturerInfo	GigE Vision Demo (0007060		
MAC address	00:11:1C:00:29:A1	DeviceVersion	Version 1.0 (1.22)		
Manufacturer	Pleora Technologies Inc.	DeviceID			
		DeviceUserID			
Model	PT1000-CL4	DeviceScanType	Areascan		
Name	N/A	ImageSizeControl			
		SensorDigitizationTaps	One		

### **Acquisition Control pane**

Features in the Acquisition Control pane

Acquisition Control pane shortcut	IP Engine feature
Mode dropdown	${\bf Acquisition And Trigger Controls} > {\bf Acquisition Mode}$
Channel dropdown	GigEVisionTransportLayer > GevStreamChannelSelector
Play button	${\bf Acquisition And Trigger Controls} > {\bf Acquisition Start}$
Stop button	${\bf Acquisition And Trigger Controls} > {\bf Acquisition Stop}$

Mode	Continuous	~
Channel	Data Channel #0	~
Play	Stop	,

GEV Device Control	
Visibility Beginner	✓ X
DecimationHorizontal	1
DecimationVertical	1
PixelFormat	Mono8
TestImageSelector	IPEngineTestPattern
AcquisitionAndTriggerControls	
AcquisitionMode	Continuous
AcquisitionStart	AcquisitionStart
AcquisitionStop	{Command}
AcquisitionFrameCount	1
CountersAndTimersControls	
CounterSelector	Counter1

# **Display pane**

### Features in the Display pane

Display pane short- cut	Image stream feature
Image count (e.g. <i>nnn</i> images)	Statistics > General > ImagesCount
Frame rate (e.g. xxx FPS)	Statistics > General > AcquisitionRateAverage
Data rate (e.g. <i>yyy</i> Mbps)	Statistics > General > BandwidthAverage



# **Tracking performance**

As your IP Engine receives images from your camera and sends them to your PC, it keeps track of image errors (missing lines, etc.), network errors (lost packets, etc.), and other performance-related statistics.

#### To track performance:

• See a complete list of error counts in the **Image Stream Control** dialog. Performance metrics are grouped in the **Statistics** folder.

		boginnor	Y	- 75
E	BytesCount		43799680	~
	lmagesCount		136874	
9	5amplingTime		3407516	
1	AcquisitionRateAver	age	40.1681	
E	BandwidthAverage		102830	
⊡ C(	ounters			
(	CountersType		Continous	
E	ExpectedResend		868	
L	.ostPacket		868	
[	DataOverrun		0	
F	PartialLineMissing		0	
F	FullLineMissing		0	
1	(magesDropped		0	~

• See a summarized list at the bottom of the **Display** pane. The pane shows the total number of images displayed (**ImagesCount**), the instantaneous frame rate (**AcquisitionRateAverage**), and the data rate (**BandwidthAverage**).



# **30** Tracking performance

# **Creating your own GigE Vision system**

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

In this section:

Customizing your software	31	
Customizing your hardware with AutoGEV	31	

### Customizing your software

For customizing your software, GEVPlayer is a good place to start — not only is it a complete application, it was designed specifically to be a sample that you can use as a template for your own application!

#### To customize your software:

- 1. Configure your IDE (integrated development environment). See the "Creating a new C/C++ project" section in the *iPORT PureGEV C++ SDK Reference Guide*.
- Copy the GEVPlayer code as a new project. To browse the GEVPlayer code (and all other samples), from the Windows Start menu, select Start > All Programs > Pleora Technologies Inc > iPORT PureGEV Suite > Code Samples.
- 3. Use the GEVPlayer code as a template for your own program. You can also use the goal-oriented procedures in the *iPORT PureGEV C++ SDK Reference Guide*.

# Customizing your hardware with AutoGEV

The IP Engine's default firmware lets you perform most image-acquisition tasks. However, you can use AutoGEV to customize your hardware.

AutoGEV is software that lets you:

- Hide unneeded features from your customer
- Create your own features
- Define the entire GEV interface
- Instantly generate new firmware (so you can test your results as you go)
- and more!

Using iPORT AutoGEV and your iPORT IP Engine, you can quickly make your existing cameras GigE Vision-compliant so you can get to market quickly.

(Contact your Pleora sales representative for details and pricing for iPORT AutoGEV software.)

#### To customize your hardware:

See the *iPORT AutoGEV Software Guide*.

# 32 Creating your own GigE Vision system

# **Technical support**

For additional help, see the "Technical support" section in the iPORT Quick Start Guide.

# 34 Technical support