Allied Vision

APPLICATION NOTE

Triggering Concept for Allied Vision

2016-Mar-18

Introduction

This document describes the basic and advanced triggering concepts for Allied Vision GigE cameras.

Basic Triggering concepts

Trigger timing diagram

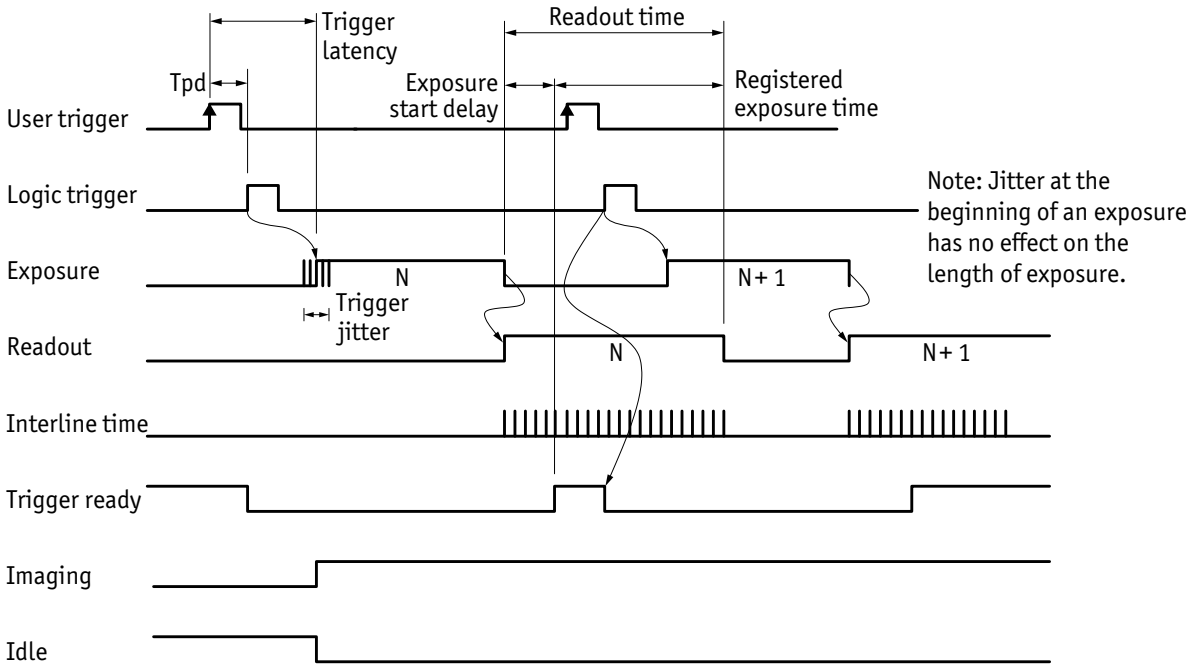

Figure 1: *Allied Vision GigE camera internal signal timing waveforms*

Notes on triggering

Term	Defintion
Logic trigger	Trigger signal seen by the camera internal logic (not visible to the user)
Tpd	Propagation delay between the user trigger and the logic trigger
Exposure	High when the camera image sensor is integrating light
Readout	High when the camera image sensor is reading out data
Trigger latency	Time delay between the user trigger and the start of exposure
Trigger jitter	Error in the trigger latency time
Trigger ready	Indicates to the user that the camera will accept the next trigger
Registered exposure time	Exposure time value currently stored in the camera memory
Exposure start delay	Registered exposure time subtracted from the readout time and indicates when the next exposure cycle can begin such that the exposure will end after the current readout
Interline time	Time between sensor row readout cycles
Imaging	High when the camera image sensor is either exposing and/or reading out data
Idle	High if the camera image sensor is not exposing and/or reading out data

Table 3: *Notes on triggering*

Trigger rules

The user trigger pulse width should be at least three times the width of the trigger latency as indicated *Specifications* chapter of the camera technical manual.

- The end of exposure will always trigger the next readout.
- The end of exposure must always end after the current readout.
- The start of exposure must always correspond with the interline time if readout is true.
- Exposure start delay equals the readout time minus the registered exposure time.

Triggering during the idle state

For applications requiring the shortest possible *Trigger Latency* and the smallest possible *Trigger Jitter* the *User Trigger* signal should be applied when *Imaging* is false and *Idle* is true. In this case, *Trigger Latency* and *Trigger Jitter* are as indicated in the *Specifications* chapter of the camera technical manual.

Triggering during the readout state

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, apply the *User Trigger* signal as soon as a valid *Trigger Ready* is detected. In this case, *Trigger Latency* and *Trigger Jitter* can be up to 1 row time since *Exposure* must always begin on an *Interline* boundary.

Advanced triggering concepts

This section provides a detailed description of the trigger concept for advanced users and special scenarios.

See GigE Camera and Driver Attributes document for detailed camera control definitions:

https://www.alliedvision.com/fileadmin/content/documents/products/cameras/various/features/GigE_Camera_and_Driver_Attributes.pdf

The acquisition/frame concept

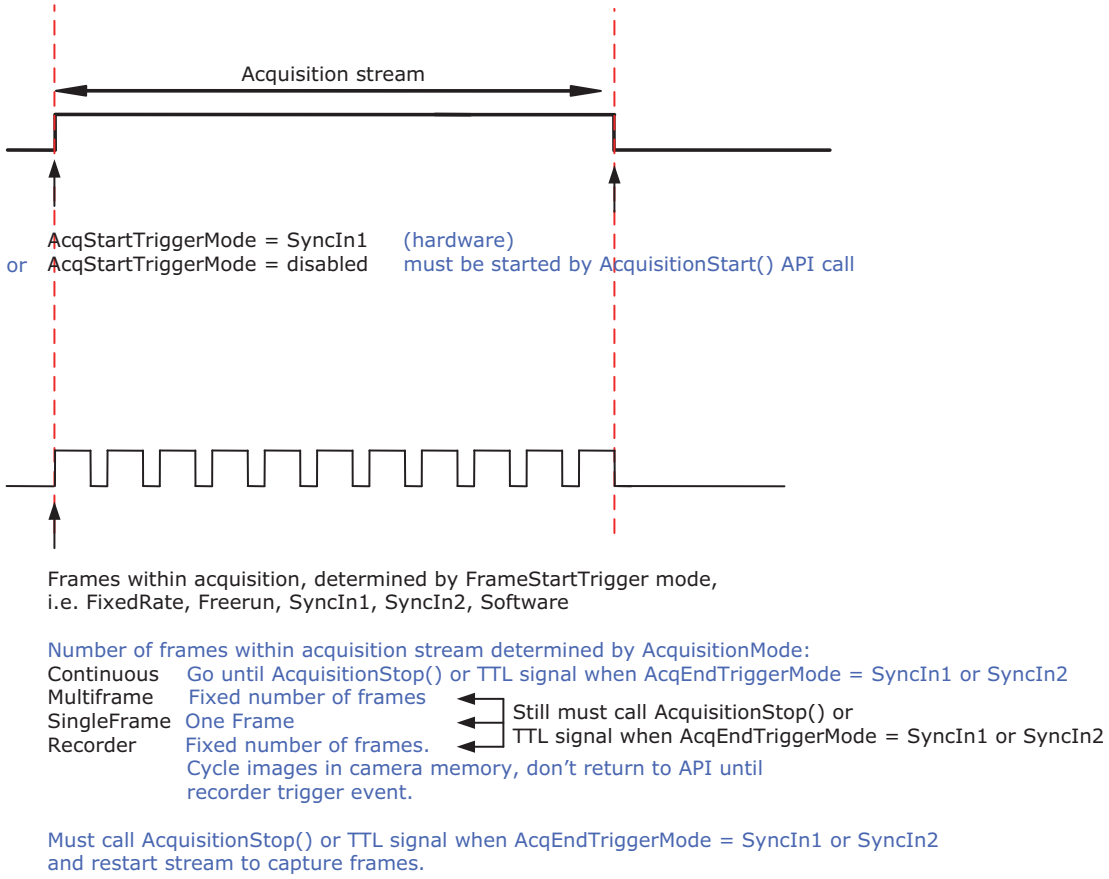

Figure 2: *AcquisitionStart and AcquisitionAbort*

Scenario 1: Acquisition controlled by hardware trigger (Freerun)

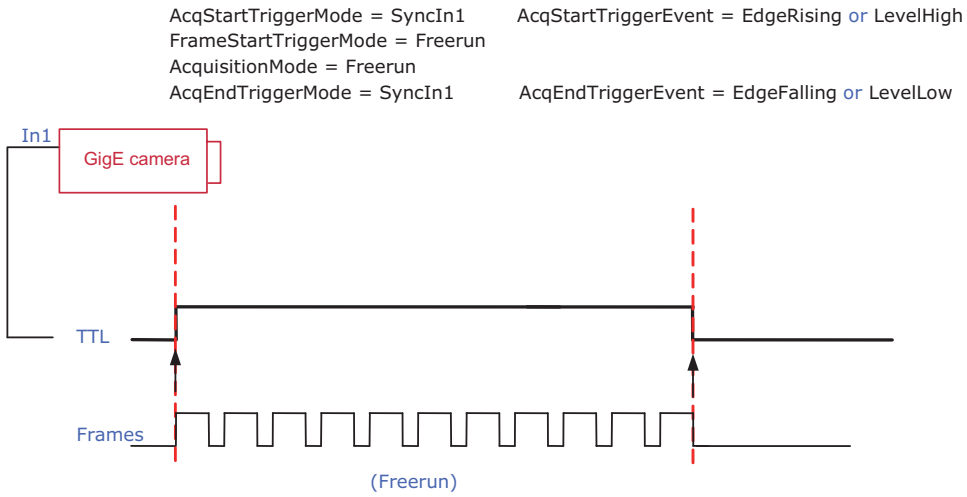

Figure 3: Trigger scenario 1: Acquisition controlled by hardware trigger (Freerun)

Figure 3: *Trigger scenario 1: Acquisition controlled by hardware trigger (Freerun)*

Scenario 2: Controlling exposure duration by external trigger

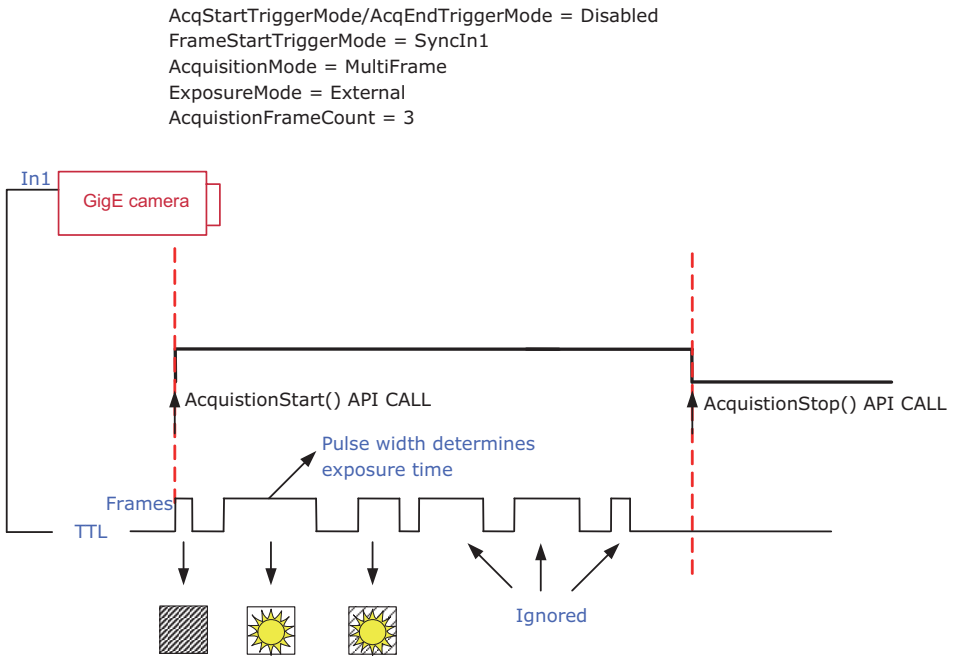

Figure 4: Trigger scenario 2: Controlling exposure duration by external trigger

Figure 4: *Trigger scenario 2: Controlling exposure duration by external trigger*

Scenario 3: Recorder mode

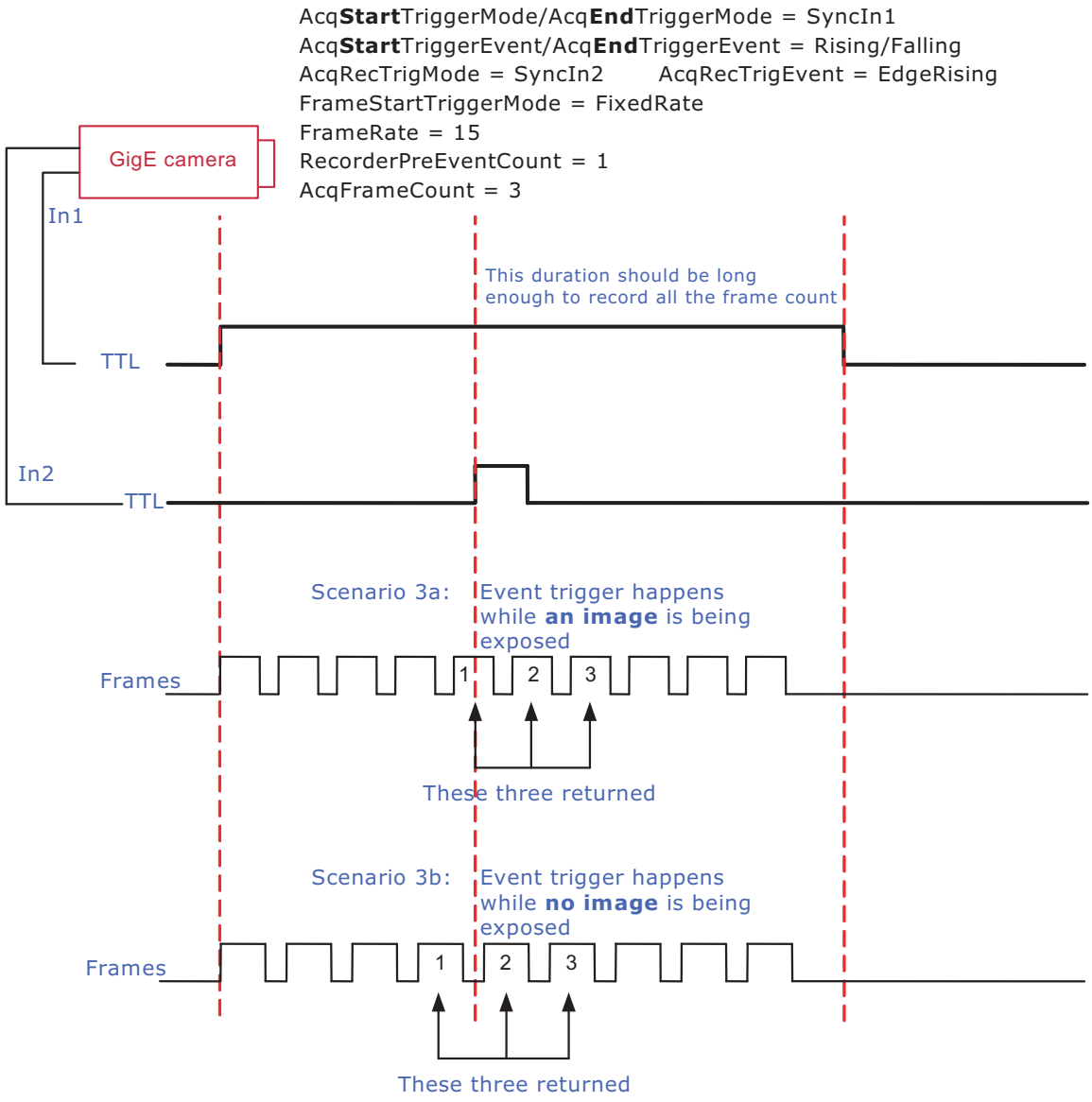

Figure 5: *Trigger scenario 3: Recorder mode*

If host reports occasional dropped frames/packets (reported as `StatFramesDropped`/ `StatPacketsMissed`) with an optimized NIC, you may need to decrease `StreamBytesPerSecond` attribute.

In Recorder mode, `AcquisitionFrameCount` cannot exceed `StreamHoldCapacity`.

Which command controls frames?

You have to distinguish between `AcqStart` and `FrameStart`.

Only `FrameStartTriggerMode` controls frames.

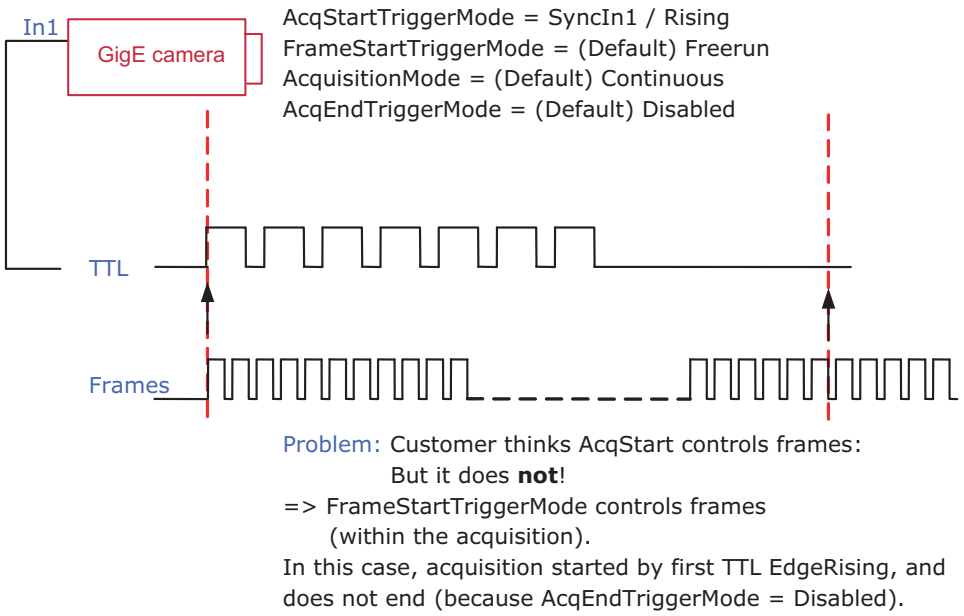

Figure 6: Which command controls frames?

Figure 6: *Which command controls frames?*

Additional References

Technical manuals and GigE feature reference
https://www.alliedvision.com/en/support/technical-documentation

For technical support, please contact support@alliedvision.com.
For comments or suggestions regarding this document, please contact info@alliedvision.com.

Disclaimer

Due to continual product development, technical specifications may be subject to change without notice. All trademarks are acknowledged as property of their respective owners. We are convinced that this information is correct. We acknowledge that it may not be comprehensive. Nevertheless, Allied Vision cannot be held responsible for any damage in equipment or subsequent loss of data or whatsoever in consequence of this document.

For the latest version of this document, please visit the Allied Vision documentation website.