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RELEASE NOTES

Coaxlink

Coaxlink Driver Version 9.5.2

PCI EXPRESS™

CoaXPress

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This documentation is provided with Coaxlink 9.5.2 (doc build 2015).

Contents

1. Release Benefits

Driver Signed for Windows 10

The Coaxlink driver in this release is now signed by Microsoft. This greatly facilitates the installation on Windows 10 since it is no longer necessary to disable the Secure Boot.

YCbCr/YUV 4:2:2 Image Acquisition

The Coaxlink driver in this release enables image acquisition from cameras delivering YCbCr601 4:2:2, YCbCr709 4:2:2 and YUV 4:2:2 pixel data using 8-bit or 10-bit pixel components.

New conversion functions are provided to transform YCbCr601 4:2:2, YCbCr709 4:2:2 and YUV 4:2:2 pixels to RGB8 and BGR8.

Improved Firmware Management

The Coaxlink Firmware Manager in this release speeds up firmware update and firmware install operations on 1630 Coaxlink Mono, 1631 Coaxlink Duo , 1632 Coaxlink Quad and 1638 Coaxlink Quad CXP-3 cards.

Memento Analyzer Probes

The Coaxlink Driver in this release provides new probes, including Acquisition, Trigger, Strobe, DMA, Scan and Readout, which can be displayed in the new Memento Analyzer.

2. Firmware Variants per Product

1630 Coaxlink Mono

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1-connection area-scan camera	1D1	Mono

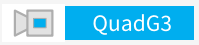
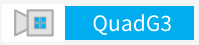
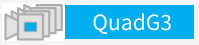
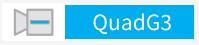
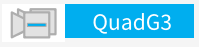
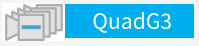
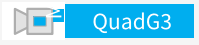
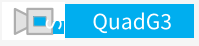
1631 Coaxlink Duo

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2-connection area-scan camera	1D2	Duo
2-camera	One or two 1-connection area-scan cameras	2D11	Duo
1-camera, line-scan	One 1- or 2-connection line-scan camera	1D2	Duo
2-camera, line-scan	One or two 1-connection line-scan cameras	2D11	Duo

1632 Coaxlink Quad

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	Quad
2-camera	One or two 1- or 2-connection area-scan cameras	2D22	Quad
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	Quad

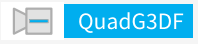
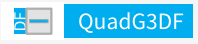
1633 Coaxlink Quad G3

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2- or 4-connection area-scan camera, 1 data-stream	1D4	
1-camera, 4-data-stream	One 1- or 2- or 4-connection area-scan camera, up to 4 data streams	1D4S4	
2-camera	One or two 1- or 2-connection area-scan cameras	2D22	
4-camera	One or two or three or four 1-connection area-scan cameras	4D1	
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	
2-camera, line-scan	One or two 1- or 2-connection line-scan cameras	2D22	
4-camera, line-scan	One or two or three or four 1-connection line-scan cameras	4D1111	
1-slm-camera	Master 4-connection sub-link of an 8-connection area-scan camera	1D8SL4	
1-sls-camera	Slave 4-connection sub-link of an 8-connection area-scan camera	1D8SL4	

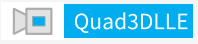
1629 Coaxlink Duo PCIe/104-EMB, 1634 Coaxlink Duo PCIe/104-MIL

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2-connection area-scan camera	1D2	
2-camera	One or two 1-connection area-scan cameras	2D11	
1-camera, line-scan	One 1- or 2-connection line-scan camera	1D2	

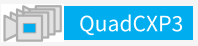
1635 Coaxlink Quad G3 DF

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	
1-df-camera	One 1- or 2- or 4-connection area-scan data-forwarded-camera	1DF4	
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	
1-df-camera, line-scan	One 1- or 2- or 4-connection line-scan data-forwarded-camera	1DF4	

1637 Coaxlink Quad 3D-LLE

Firmware Variant	Description	HCMAP	Icon
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	

1638 Coaxlink Quad CXP-3

Firmware Variant	Description	HCMAP	Icon
4-camera	One or two or three or four 1-connection area-scan cameras	4D1111	

3. Release Specification

3.1. Products & Accessories

Coaxlink Products

Product	S/N Prefix	Icon
1629 Coaxlink Duo PCIe/104-EMB	KDI	Duo104EMB
1630 Coaxlink Mono	KMO	Mono
1631 Coaxlink Duo	KDU	Duo
1632 Coaxlink Quad	KQU	Quad
1633 Coaxlink Quad G3	KQG	QuadG3
1634 Coaxlink Duo PCIe/104-MIL	KDR	Duo104MIL
1635 Coaxlink Quad G3 DF	KDF	QuadG3DF
1637 Coaxlink Quad 3D-LLE	KQE	Quad3DLLE
1638 Coaxlink Quad CXP-3	KQL	QuadCXP3

Related Accessories

Product	S/N Prefix	Icon
1625 DB25F I/O Adapter Cable		1625
1636 InterPC C2C-Link Adapter	KCC	1636
3300 HD26F I/O module for Coaxlink Duo PCIe/104		3300
3301 Thermal drain (Model 1) for Coaxlink Duo PCIe/104		3301
3302 DIN1.0/2.3 Coaxial cable for Coaxlink Duo PCIe/104		3302
3303 C2C-Link Ribbon Cable		3303
3304 HD26F I/O Adapter Cable		3304

The S/N prefix is a 3-letter string at the beginning of the card serial number.

Icons are used in this document for tagging titles of card-specific content.

3.2. Supported Operating Systems

Windows

The Coaxlink Driver is designed to support all Windows versions from 7 to 10, including the server versions, on x86 (32-bit) and x86_64 (64-bit) platforms.

This release has been validated with the following Windows versions:

OS Name & Version	Platform	Notes
Microsoft Windows 7	x86 (32-bit)	Service Pack 1 with KB3033929 and KB2921916 updates
Microsoft Windows 8.1	x86 (32-bit)	-
Microsoft Windows 8.1	x86-64 (64-bit)	-
Microsoft Windows 10	x86-64 (64-bit)	Version 1709, a.k.a. Fall Creators Update

Note: *Power saving modes of the operating systems (StandBy, Sleep, Suspend...) are not supported.*

Linux

The Coaxlink Driver is designed to be distribution-independent on x86, x86_64, and aarch64 platforms. It is expected to work with a wide range of distributions.

This release has been validated with the following distribution(s):

OS Name & Version	Platform	Notes
Linux CentOS 7	x86 (32-bit)	Kernel version 3.10
Linux Ubuntu 14.04	x86 (32-bit)	Kernel version 3.13
Linux Ubuntu 14.04	x86-64 (64-bit)	Kernel version 3.13
Linux Ubuntu 16.04 LTS	aarch64 (64-bit)	Kernel version 3.10.96-tegra
Linux Ubuntu 17.04	x86_64 (64-bit)	Kernel version 4.10

Note: *Power saving modes of the operating systems (StandBy, Sleep, Suspend...) are not supported.*

3.3. Development Tools

The Coaxlink Driver is supplied as GenICam GenTL producer libraries (coaxlink.cti):

- An x86 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86 applications.
- An x86_64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86_64 applications.
- An aarch64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of aarch64 applications.
- A .NET assembly designed to be used with development environments compatible with .NET frameworks version 2.0 or higher.

The Coaxlink cards should be usable with any development tool that supports at least one of these interfaces.

3.4. Memento

Memento version 4.0 or later is required when using Coaxlink Driver version 4.0 or later.

Memento version 9.5 is required to use the Memento Analyzer.

3.5. Software Tools

Tool Name	**Tool Description**
Coaxlink Firmware Manager	Tool for installing or upgrading the firmware embedded on the Coaxlink cards.
GenICam Browser (64-bit)	64-bit version of the GUI tool giving access to all the GenICam features exposed by the GenTL Producer(s) in your system
GenICam Browser	32-bit version of the GenICam browser
GenTL Console (64-bit)	64-bit version of the command-line tool giving access to all the functions and commands exposed by the Euresys GenTL Producer
GenTL Console	32-bit version of the GenTL Console

4. Important Notices

Important notifications to be read before installing and/or using the product on your PC!

4.1. Firmware Version Requirements

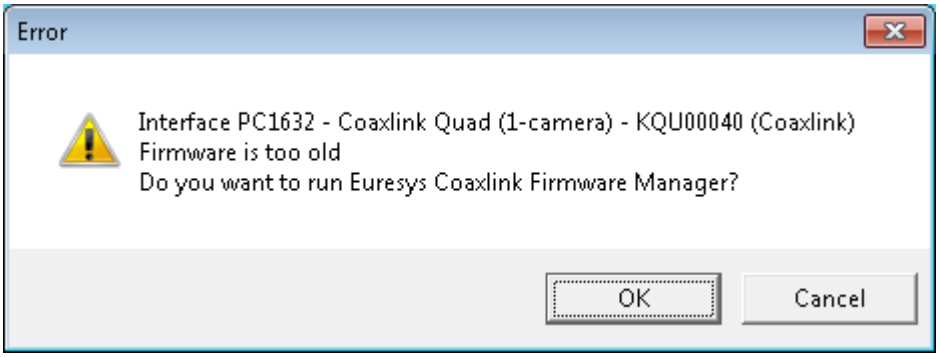
Coaxlink Driver 9.5

The following table specifies the required minimum firmware version for all combinations of product and firmware variant:

Product/Firmware Variant Combinations	Min. Firmware Version Number
All product/firmware variant combinations	232

IMPORTANT NOTE
It is **mandatory** to apply the Firmware Upgrade procedure prior to using this version of the driver.

The Coaxlink Driver checks the compatibility of the firmware installed on every Coaxlink card. For Coaxlink cards having an incompatible firmware, the GenTL driver exposes 0 (zero) Device and the GenICam browser displays a "Firmware too old" error message:

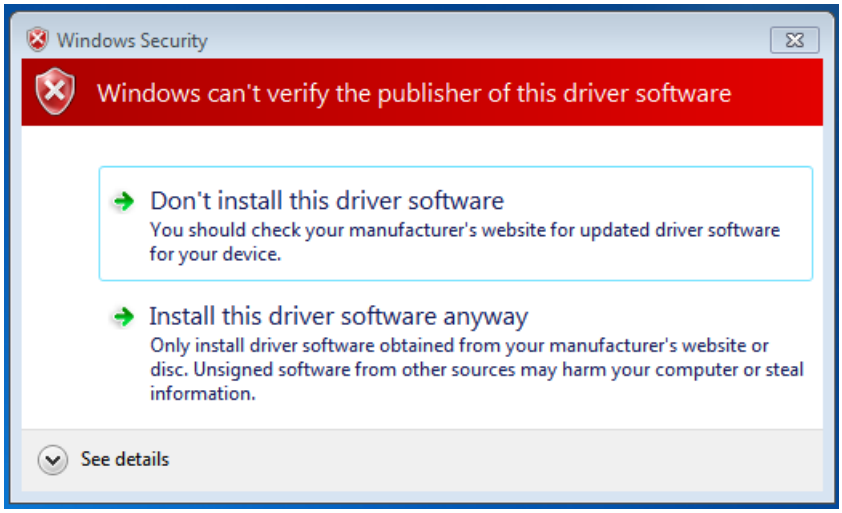


"Firmware too old" error message

4.2. CPU Requirements

The image converter requires a CPU that has the Supplemental Streaming SIMD Extension 3 (SSSE3) instruction set.

4.3. Driver Installation on Windows



Windows Security warning at driver installation on Microsoft Windows when VeriSign Universal Root CA is missing

This warning occurs when the VeriSign Universal Root CA certificate is missing from the Windows certificate store, which can happen if the system is not connected to the Internet and thus does not receive root certificates updates.

This issue can be solved by installing this missing certificate, which is available in an archive that can be downloaded here, on the Symantec website.

4.4. Driver Installation on Windows 7

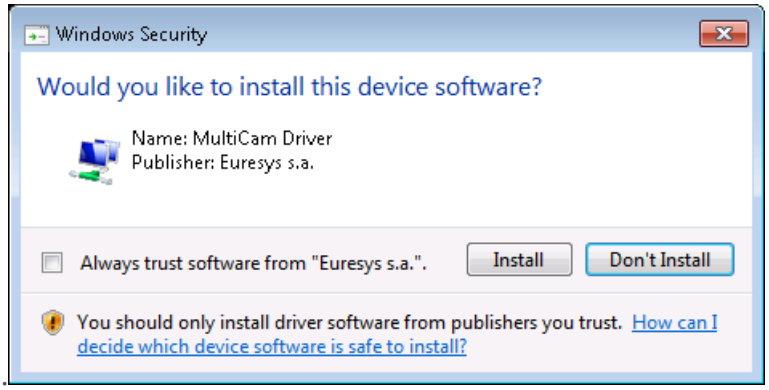
Renewal of the "Code Signing For Microsoft Authenticode" certificate for Euresys drivers and SHA-256 support

Since April 2016, Euresys drivers have been signed with a new SHA-256 code-signing certificate, which is required by Microsoft since January 2016 following its SHA-1 deprecation schedule.

Microsoft Windows 7 and Microsoft Windows Server 2008 R2 now require at least SP1 as well as some specific Windows updates in order to support SHA-256 certificates.

Caution: The following Windows updates are required and must be installed before using Euresys drivers on Microsoft Windows 7 and Microsoft Windows Server 2008 R2:

- KB3033929 (provides support for SHA-256 certificates which are required by Microsoft): without this one, a “Windows cannot verify the digital signature for the drivers required for this device” (code 52) error will prevent the Euresys drivers from loading.
- KB2921916: this hot-fix avoids the “Would you like to install this driver software?” dialog to pop up at each driver installation (see picture below), even if the user checked the “Always trust software from “Euresys s.a.” check box



“Would you like to install this driver software?” pop-up message

4.5. Driver Installation on Windows 10

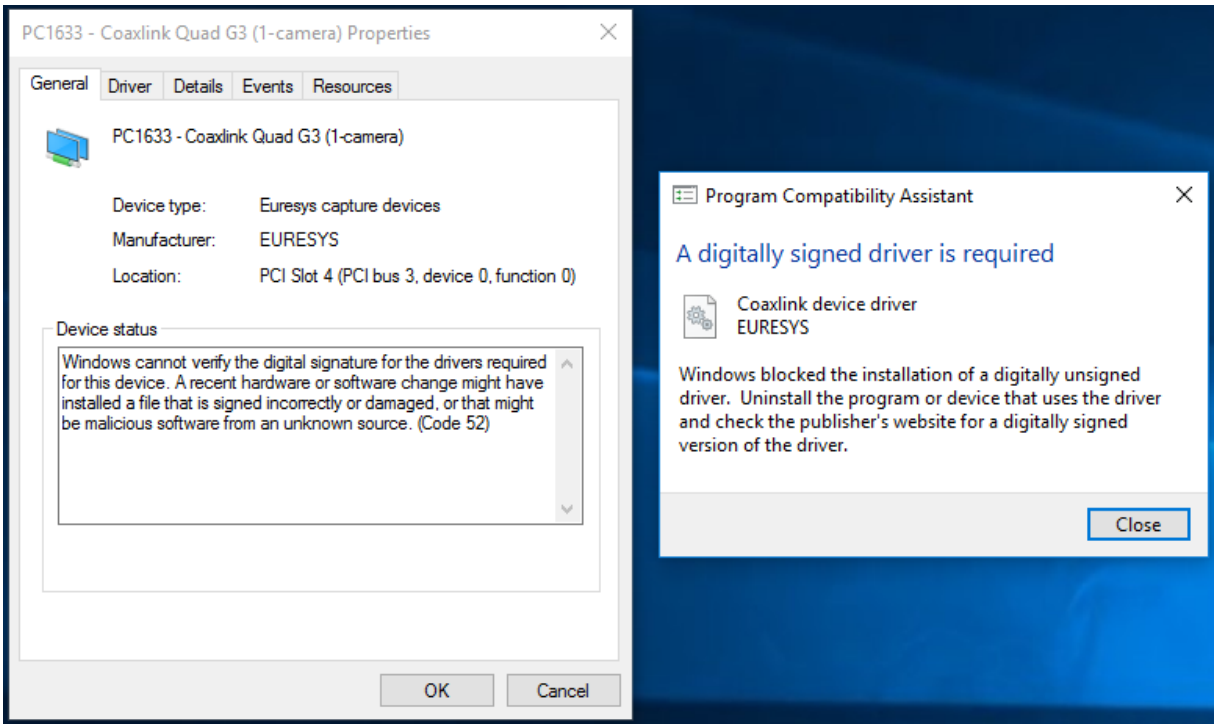
Configuration requirements for installing Euresys drivers on Windows 10

This notice applies to the following Euresys drivers:

- Coaxlink Driver since version 4.7 until version 9.5.1,
- Memento Driver since version 4.7 until version 9.5.1,
- MultiCam Driver since version 6.9.8 until version 6.14.

Note: *The notice remains applicable when installing the above drivers on Windows Server 2016!*

When installing Euresys drivers on a fresh install of Windows 10, the UEFI Secure Boot feature must be disabled in BIOS so that the Euresys drivers can be loaded by Windows when Secure Boot is enabled.



Device Manager error message

5. Release Details

5.1. Added/Improved Features

List and description of added or improved features since Coaxlink Driver version 9.5

Coaxlink Driver 9.5

Installers

Windows 10 Installers
Added a new installer named `coaxlink-win10-9.5.2.131.exe` that contains a Windows 10 driver signed by Microsoft. With this installer, it is no longer necessary to disable Secure Boot. **Note:** *The `coaxlink-win-9.5.2.131.exe` installer embedding drivers signed by Euresys remains available in case of issues with the other installer.* **Note:** *Installation on Windows Server 2016 still requires disabling Secure Boot.*

Memento

Tooltips
Added tooltips for memento traces that raise frequent questions. Added tooltips for memento kinds.

Debug and Monitoring

Analyzer probes
Added analyzer probes: `Acquisition`, `Trigger`, `Strobe`, `DMA`, `Scan`, `Readout`, `Lock`, `Rate`, `Extension`, `q.Input`, `q.Output`, `q.Unqued`, and `q.Pending`. These probes feed the Memento Analyzer Tool.

Firmware Management

Reduced programming time
Increased the speed of firmware update and firmware install operations on 1630 Coaxlink Mono, 1631 Coaxlink Duo and 1632 Coaxlink Quad and 1638 Coaxlink Quad CXP-3 cards.

Pixel Formats

YCbCr601 4:2:2/YCbCr709 4:2:2/YUV 4:2:2 pixel formats
Added support for: • `YCbCr601_422_8` and `YCbCr601_422_10` • `YCbCr709_422_8` and `YCbCr709_422_10` • `YUV422_8` and `YUV422_10`

Image Converter

YCbCr/YUV 4:2:2 to RGB
Added conversions from YCbCr601 4:2:2, YCbCr709 4:2:2 and YUV 4:2:2 to RGB8 and BGR8

Sample Programs

EGrabber Sample Programs
Added `500-grabn-cuda-process` sample to demonstrate image acquisition and processing with a NVIDIA CUDA GPU
Added `620-multiple-camera` sample to demonstrate concurrent image acquisition from multiple cameras

Installers

Linux Installer
• Added INSTALL file documenting installation steps. • Added option `-m` to `install.sh`. This allows to use a previously built driver `coaxlink.ko`. • Improved Coaxlink module `Makefile`. This allows targeting a specific kernel using the variable `KDIR` . • Improved the installation script. The script suggests system-dependent instructions to install the missing tools or libraries.

5.2. Solved Issues

Coaxlink Driver 9.5

BSOD at shutdown on a Windows 7 PC

Fixed potential BSOD at system shutdown on Windows 7 that occurs with Coaxlink driver versions between 9.5.0 and 9.5.1.

UNEXPECTED_KERNEL_MODE_TRAP blue screen

Fixed an issue that could sometimes lead to an UNEXPECTED_KERNEL_MODE_TRAP blue screen.

Unexpected "Unsupported output packed format" warning message in GenICam Browser

Fixed an issue that led to *Unsupported output packed format* warning messages in Memento when acquiring packed Mono formats (e.g., `Mono10pmsb`) in GenICam Browser.

5.3. Breaking Changes

Changes in the API that are not backward compatible.

Since Coaxlink Driver 9.3.1

Removed data stream event counts from the list of possible contexts of device event notifications

Removed data stream event counts from the list of possible contexts of device event notifications.

`StartOfCameraReadoutEventCount`, `EndOfCameraReadoutEventCount`, `StartOfScanEventCount`, `EndOfScanEventCount`, `RejectedFrameEventCount`, and `RejectedScanEventCount` are no longer valid values for `EventNotificationContext1`, `EventNotificationContext2`, and `EventNotificationContext3` in the device module.

Since Coaxlink Driver 9.3

Reset of StartOfScanTriggerSource, EndOfScanTriggerSource and ScanLength features

Data stream features `StartOfScanTriggerSource`, `EndOfScanTriggerSource` and `ScanLength` are now reset by the data stream feature `StreamReset`. Previously, they were reset by the device feature `DeviceReset`.

Since Coaxlink Driver 9.2

GenAPI Features Range Checking

Range checking will prevent applications from setting forbidden values to camera features. A meaningful error will be reported if such an event should happen.

Since Coaxlink Driver 9.1.1

Camera Model - Exposure Time Range Boundaries

When `ExposureTimeMin` and/or `ExposureTimeMax` are/is set, the order in which the features `ExposureTimeMin`, `ExposureTimeMax` and `ExposureTime` are set is imposed by the constraints.

Since Coaxlink Driver 7.1.1

GenTL 1.5 Header File

Moved to standard GenTL 1.5 header file (was previously GenTL 1.4):

- GenTL 1.5 changed namespace from `GenICam::Client` to `GenTL`,
- Coaxlink custom GenTL definitions have been moved accordingly from the namespace `GenICam::Client::Euresys` to namespace `GenTL::EuresysCustomGenTL`,
- replaced header file `GenTL_v1_4.h` by `GenTL_v1_5.h`,
- replaced header file `GenTL_v1_4_EuresysCustom.h` by `GenTL_v1_5_EuresysCustom.h`.

Euresys::GenTL Class Renaming

Renamed the class `Euresys::GenTL` into `Euresys::EGenTL` to avoid name conflicts with the new standard GenTL 1.5 namespace `GenTL`. This will impact any code using the class `Euresys::GenTL`:

- renamed header file `EuresysGenTL.h` into `EGenTL.h`,
- renamed header file `EuresysGenTLErrors.h` into `EGenTLErrors.h`,
- `Euresys::EGenTL` is now declared in header file `EGenTL.h`.

Deprecated Euresys::SharedGenTL Class

Deprecated the class `Euresys::SharedGenTL`, which is still available by defining `EURESYS_USE_SHAREDGENTL_DEPRECATED_API`. Two options to fix user code:

- recommended change: replace all occurrences of `Euresys::SharedGenTL` by `Euresys::EGenTL`,
- add `#define EURESYS_USE_SHAREDGENTL_DEPRECATED_API` before `#include <EGrabber.h>`, a quick fix that doesn't require changing source code.

GenTL 1.5 Changes

Announcing or revoking buffers while acquiring returns the error code `GC_ERR_BUSY` (was `GC_ERR_RESOURCE_IN_USE` for GenTL 1.4)

Revoking a queued buffer returns the error code `GC_ERR_BUSY` (was `GC_ERR_RESOURCE_IN_USE` for GenTL 1.4)

New device access status values (defined by GenTL 1.5) returned by the GenTL functions `IFGetDeviceInfo` and `DevGetInfo` for the command `DEVICE_INFO_ACCESS_STATUS`:

- `DEVICE_ACCESS_STATUS_OPEN_READWRITE`: when the device is opened by the current producer with read/write access

GenTL 1.5 Changes

- `DEVICE_ACCESS_STATUS_OPEN_READONLY`: when the device is opened by the current producer with read-only access

Since Coaxlink Driver 7.0.0

OemSafetyKey Length

The length of `ProgramOemSafetyKey` and `CheckOemSafetyKey` is now limited by a user-configurable `MaximumOemKeyLength` (4096 characters by default)

LUT Configuration Locking

LUT configuration features (datastream) are locked while grabbing.

CIC Features Availability

Features related to the CIC (device) are not available when `CameraControlMethod` is `NC` or `EXTERNAL`

Since Coaxlink Driver 4.6.1

EGrabber API

Deprecated EGrabber method `announceBuffer` (superseded by `announceAndQueue`).

Two options to fix user code:

- recommended change: replace all occurrences of `announceBuffer` by `announceAndQueue(GenTLMemory(...))` or `announceAndQueue(UserMemory(...))`,
- Add `#define EURESYS_USE_EGRABBER_DEPRECATED_API` before `#include <EGrabber.h>`.

Since Coaxlink Driver 4.5.1

Euresys Name Space for EGrabber Classes

EGrabber C++ classes now belong to `Euresys` namespace.

Two options to fix user code:

- recommended change: replace each occurrence of `EGrabber` by `Euresys::EGrabber`,

Add `using namespace Euresys;` after `#include <EGrabber.h>`.

Since Coaxlink Driver 4.4.1

EGrabber API

The API of `EGrabber` .NET classes have changed since Coaxlink 4.4.0 beta

`GenTL` class now behaves like `SharedGenTL`, which is what most users need

- The `GenTL` constructor accepts a new argument, named `shared`, which can be used to revert to the old behavior.

RGBConverter.h

Added `inplace1x2yeReordering` methods instead of `Inplace1x2yeReordering` class

- User code needs to be adapted to call `inplace1x2yeReordering` instead of creating an `Inplace1x2yeReordering` instance, please see `include/RGBConverter.h` for a code sample.

Since Coaxlink Driver 4.4.0

.NET Assembly

Added new assembly exposing `EGrabber` classes, previous `CoaxlinkGrabber` classes are removed from the assembly.

EGrabber

Deprecated `getInfoString` methods (replaced by `getInfo`).

Two options to fix user code:

- recommended change: replace all occurrences of `getInfoString<module>` (and `getBufferInfoString`) by `getInfo<module, std::string>` (and `getBufferInfo<std::string>`)
- Add `#define EURESYS_USE_EGRABBER_DEPRECATED_API` before `#include <EGrabber.h>`.

GenTL C++ class

Deprecated `bayerConvert`

Though the function `bayerConvert` is superseded by the image converter, it is still possible to use it, if required please add `#define EURESYS_USE_BAYER_DEPRECATED_API` before `#include <EuresysGenTL.h>` or `#include <EGrabber.h>`

Since Coaxlink Driver 4.3

Data Stream Module GenICam Feature
`UnpackingMode`: Changed default value to LSB (instead of MSB)

Since Coaxlink Driver 4.1

Device Module Features
Merged `CycleTriggerSource` and `CycleHardwareTriggerSource` features.
Renamed `CycleSoftwareTrigger` into `StartCycle`.
Renamed `CyclePeriodTarget` into `CycleMinimumPeriod`.
Renamed `ErrorCounter` into `ErrorCount`.
Renamed `ErrorCounterReset` into `ErrorCountReset`.
Removed backward compatibility for deprecated features: `TriggerSource`, `TargetFramePeriod`, `ExposureRecovery`.

6. Known Issues

6.1. Deviations from the CoaXPress specification

CoaXPress 1.1.1 Discovery

The **10.1.3 Discover Devices and Connection Topology** paragraph of the CoaXPress 1.1.1 standard claims:

"The Host shall read the `ConnectionConfigDefault` register to find the number of expected connections. It shall then write to the `ConnectionConfig` register to enable the number of connections read from `ConnectionConfigDefault`. However it shall not change from the discovery rate at this stage."

The **10.3.33 ConnectionConfig** paragraph of the CoaXPress 1.1.1 standard claims:

"This register shall hold a valid combination of the Device connection speed and number of active downconnections. Writing to this register shall set the connection speeds on the specified connections, and the high speed upconnection, if supported. If the new ConnectionConfig value results in a change of connection speed, the Device shall acknowledge the ConnectionConfig access at the original connection speed. Therefore it shall acknowledge the access before changing connection speed."

Not all theoretical combinations of connection speed and number of connections may be usable. One register is used to ensure that the two variables are set simultaneously. The XML file and product documentation give valid combinations for the Device. A connection reset sets the value corresponding to the selected discovery rate and one connection.

Considering that:

1. the above paragraphs disagree on the value that should be written to the `ConnectionConfig` register,
2. changing the behavior to respect CoaXPress 1.1.1 statements causes issues with some cameras,

the CoaXPress discovery procedure of the Coaxlink Driver is not modified to comply with CoaXPress 1.1.1.

At the end of the discovery procedure, the Coaxlink Driver sets the speed and the number of the connections of the CoaXPress Link according to the settings of `ConnectionConfigDefault` register of the camera.

Device to Host Connection Maps

The CoaXPress standard suggests that Devices (cameras or data forwarding devices) can be connected to the Host (frame grabber) using a free connection scheme.

Instead, the Host Interface of Coaxlink requires a specific assignment of the Device connections to the Host connectors. Such assignment is named **Host Connection Map**.

The Host Connection Map is hard-coded in the product/firmware variant. The Coaxlink product and firmware variant must be selected according to the required mapping!

Host Connection Map Naming Convention

The **Host Connection Map** or **HCMAP** designates how the connections of the Host Interface of a Coaxlink card are allocated to the Devices (cameras).

A Host Connection Map - HCMAP - is designated by an acronym using the following Euresys proprietary naming convention:

```
<dev#><dev-type>[<str#>S]{<con#>...<con#>}[<SL-con#>]
```

where:

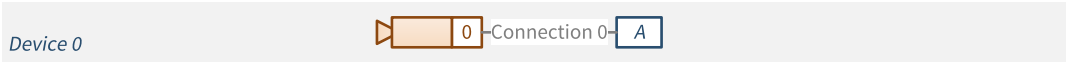
- `<dev#>`declares the maximum number of Devices (cameras) that can be attached to the Host Interface.
  - `1` for a single-device Host interface
  - `2` for a 2-device Host interface
  - ...
- `<dev-type>` declares the device type.
  - `D` for standard CoaXPress devices
  - `DF` for virtual devices used in the Data Forwarding schemes
- `<con#>` declares the number of connections available for each device. *This field is repeated once for each device.*
  - 1 for a single-connection device
  - 2 for 2-connection device
  - ...
- <str#>S declares the maximum number of data streams allowed by a device.
  - This field is omitted when there is only 1 stream
  - 4S for a up to 4 data-streams per device
- `SL<-con#>` declares the number connections per sub-link.
  - *This field is omitted when there are no sub-links.*
  - `SL4` for a 4-connection sub-links

Examples

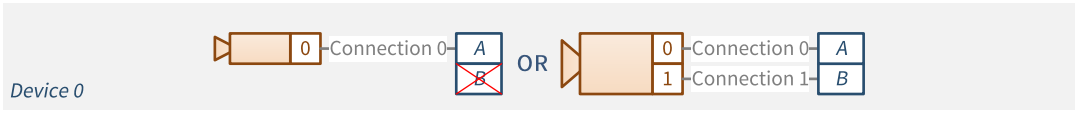
HCMAP **2D22** designates a Host Interface with 2 standard 1-data-stream CoaXPress Devices and 2 connections for each device.

HCMAP **1D4S4** designates a Host Interface with 1 standard CoaXPress Devices, up to 4 data streams, and 4 connections per device.

Host Connection Maps – Standard CoaXPress Devices

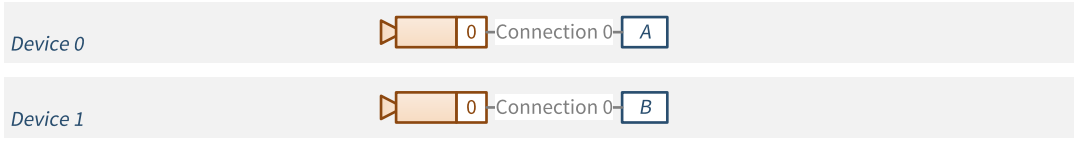


1D1 host connection map

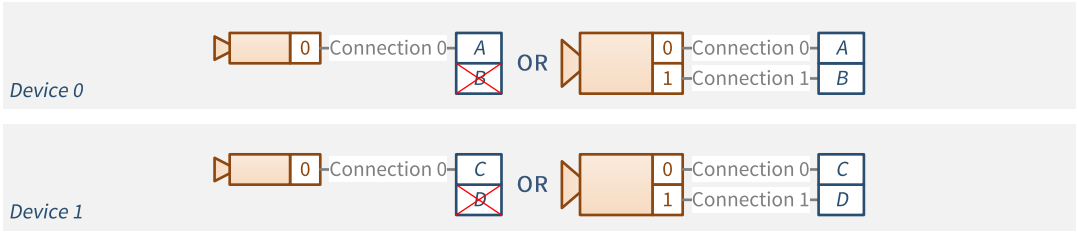


1D2 host connection map

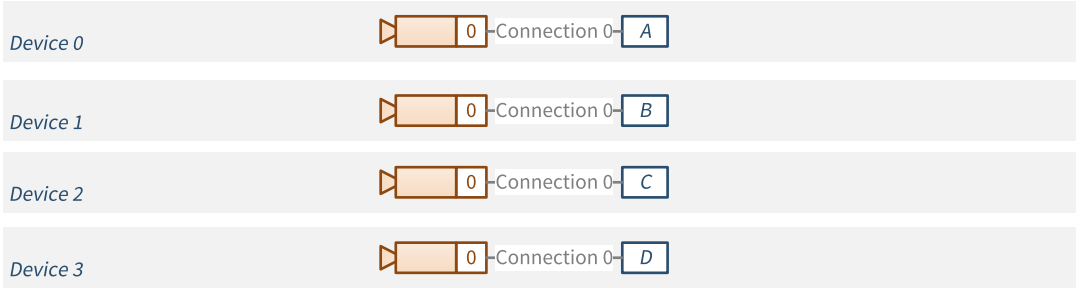
1D4 host connection map



2D11 host connection map



2D22 host connection map



4D1111 host connection map

6.2. Deviations from the GenTL specification

EventKill

The GenTL specification states that:

- In case of multiple pending wait operations `EventKill` causes one wait operation to return with a `GC_ERR_ABORT` error code.
- This means that if more than one thread waits for an event, the `EventKill` function terminates only one wait operation and other threads will continue execution.
- Therefore in order to cancel all pending wait operations `EventKill` must be called as many times as wait operations are pending.
- In case this function is called while no wait operation was pending the next call to `EventGetData` will return a `GC_ERR_ABORT`.

This specification is nothing but the behavior description of a particular implementation based on a Windows auto-reset event.

This implementation is prone to race conditions: calling `EventKill` N times in a row to kill exactly N waiting threads is not guaranteed to work as expected because signaling an event that is already in the signaled state has no effect. In other words, some of the `EventKill` calls could have no effect.

`EventKill` as specified is not easy to use: How many `EventKill` calls are required? How many `EventGetData` calls should we expect to return `GC_ERR_ABORT`? Note that race conditions affect these questions.

The Euresys GenTL implementation solves these issues, but differs slightly:

- `EventKill` aborts all pending wait operations on the event handle.
- `EventKill` has no impact on subsequent wait operations.

DSStopAcquisition

The GenTL specification states that:

- Each call to `DSStartAcquisition` must be accompanied by a call to `DSStopAcquisition`.
- Argument `iNumToAcquire` passed to `DSStartAcquisition` sets the number of filled/delivered buffers after which the acquisition engine stops automatically.
- There must be a call to `DSStopAcquisition` accompanying each call to `DSStartAcquisition` even though the stream already stopped because the number of frames to acquire was reached.

- `DSStopAcquisition` returns `GC_ERR_RESOURCE_IN_USE` when the acquisition engine has already been terminated or has not been started.

The reasons for this behavior is not clear.

The Euresys GenTL implementation differs slightly:

- `DSStopAcquisition` will not return `GC_ERR_RESOURCE_IN_USE` if the data stream hasn't been started.
- `DSStopAcquisition` will not return `GC_ERR_RESOURCE_IN_USE` if the data stream has already been stopped by a prior call to `DSStopAcquisition`.
- `DSStopAcquisition` will not return `GC_ERR_RESOURCE_IN_USE` if the data stream has stopped automatically after `iNumToAcquire` images have been captured.

In other words, `DSStopAcquisition` is idempotent.

With the Euresys implementation, it is not necessary to treat some errors as normal, and race conditions (between `DSStopAcquisition` and the automatic stop of the data stream are avoided. Furthermore, if the data stream has stopped automatically after acquiring `iNumToAcquire` images, `DSStartAcquisition` can be called without first calling `DSStopAcquisition`.

6.3. Deviations from the PCIe 3.0 specification

Applies to: QuadG3 QuadG3DF

1633 Coaxlink Quad G3 and 1635 Coaxlink Quad G3 DF operate only at PCIe 2.0 and PCIe 3.0 link speeds.

These products cannot be used when inserted in PCIe revision 1.x slots.

6.4. Functional Limitations

aarch64 ARM Processor Architecture

Image Converters

The image conversion functions for the aarch64 ARM processor architecture don't use the ARM NEON general-purpose SIMD engine.

1638 Coaxlink Quad CXP-3

Applies to: QuadCXP3

Pixel Unpacking

1638 Coaxlink Quad CXP-3 doesn't allow to disable the pixel unpacking by setting **Unpacking** to **Off**. Both **Msb** and **Lsb** unpacking modes are supported.

10-bit, 12-bit and 14-bit pixels are always unpacked to 16-bit

Color Components Swap

1638 Coaxlink Quad CXP-3 doesn't allow to swap the red (first-) and the blue (last-) color component by setting **RedBlueSwap** to **True**.

4:2.2 Pixel formats

1638 Coaxlink Quad CXP-3 doesn't support YCbCr 4:2:2 and YUV 4:2:2 pixel formats.