

# Coaxlink

Coaxlink 10.2.1



PCI  
EXPRESS<sup>TM</sup>

CoaxPress

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# 1. Release Benefits

## Coaxlink 10.2

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### Support of four area-scan cameras for 3602 Coaxlink Octo

This release of Coaxlink allows to connect up to four 1- or 2-connection area-scan cameras to 3602 Coaxlink Octo.

### Support of five area-scan cameras for 3602 Coaxlink Octo

This release of Coaxlink allows to connect up to five area-scan cameras to 3602 Coaxlink Octo:

- One 1-, 2- or 4-connection area-scan camera and ...
- Up to four 1-connection area-scan cameras

### New Events Sources

This release of Coaxlink allows the application to be notified of "Camera Connection" and "Camera Disconnection" events.

# 2. Release Specification

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## 2.1. Products & Accessories

### Coaxlink Products

Product	S/N Prefix	Icon
1629 Coaxlink Duo PCIe/104-EMB	KDI	<a href="#">Duo104EMB</a>
1630 Coaxlink Mono	KMO	<a href="#">Mono</a>
1631 Coaxlink Duo	KDU	<a href="#">Duo</a>
1632 Coaxlink Quad	KQU	<a href="#">Quad</a>
1633 Coaxlink Quad G3	KQG	<a href="#">QuadG3</a>
1633-LH Coaxlink Quad G3 LH	KQH	<a href="#">QuadG3LH</a>
1634 Coaxlink Duo PCIe/104-MIL	KDR	<a href="#">Duo104MIL</a>
1635 Coaxlink Quad G3 DF	KDF	<a href="#">QuadG3DF</a>
1637 Coaxlink Quad 3D-LLE	KQE	<a href="#">Quad3DLLE</a>
1638 Coaxlink Quad CXP-3	KQL	<a href="#">QuadCXP3</a>
3602 Coaxlink Octo	KOC	<a href="#">Octo</a>

### Related Accessories

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

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

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

## 2.2. Firmware Variants per Product

### 1630 Coaxlink Mono

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1-connection area-scan camera	1D1	512 MB

### 1631 Coaxlink Duo

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2-connection area-scan camera	1D2	1 GB
2-camera	One or two 1-connection area-scan cameras	2D11	512 MB
1-camera, line-scan	One 1- or 2-connection line-scan camera	1D2	1 GB
2-camera, line-scan	One or two 1-connection line-scan cameras	2D11	512 MB

### 1632 Coaxlink Quad

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	1 GB
2-camera	One or two 1- or 2-connection area-scan cameras	2D22	512 MB
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	1 GB



### 1633 Coaxlink Quad G3

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2- or 4-connection area-scan camera, 1 data-stream	1D4	1 GB
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	512 MB
4-camera	One or two or three or four 1-connection area-scan cameras	4D1	256 MB
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	1 GB
2-camera, line-scan	One or two 1- or 2-connection line-scan cameras	2D22	512 MB
4-camera, line-scan	One or two or three or four 1-connection line-scan cameras	4D1111	256 MB
1-slm-camera	Master 4-connection sub-link of an 8-connection area-scan camera	1D8SL4	1 GB
1-sls-camera	Slave 4-connection sub-link of an 8-connection area-scan camera	1D8SL4	1 GB

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

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2-connection area-scan camera	1D2	512 MB
2-camera	One or two 1-connection area-scan cameras	2D11	256 MB
1-camera, line-scan	One 1- or 2-connection line-scan camera	1D2	256 MB

### 1635 Coaxlink Quad G3 DF

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	1 GB
1-df-camera	One 1- or 2- or 4-connection area-scan data-forwarded-camera	1DF4	1 GB
1-camera, line-scan	One 1- or 2- or 4-connection line-scan camera	1D4	1 GB
1-df-camera, line-scan	One 1- or 2- or 4-connection line-scan data-forwarded-camera	1DF4	1 GB

### 1637 Coaxlink Quad 3D-LLE

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2- or 4-connection area-scan camera	1D4	1 GB

### 1638 Coaxlink Quad CXP-3

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
4-camera	One or two or three or four 1-connection area-scan cameras	4D1111	128 MB

### 3602 Coaxlink Octo

Firmware Variant	Description	Host Connections Map	Stream Buffer Size
1-camera	One 1- or 2- or 4- or 8-connection area-scan camera	1D8	2 GB
2-camera	One or two 1- or 2- or 4-connection area-scan cameras	2D44	1 GB
4-camera	One or two or three or four 1- or 2-connection area-scan cameras	4D2222	512 MB
5-camera	One 1- or 2- or 4-connection area-scan camera and one or two or three or four 1-connection area-scan cameras	5D41111	1GB 256 MB
8-camera	Up to eight 1-connection area-scan cameras	8D11111111	256 MB
1-camera, line-scan	One 1- or 2- or 4- or 8-connection line-scan camera	1D8	2 GB
2-camera, line-scan	One or two 1- or 2- or 4-connection line-scan cameras	2D44	1 GB

## 2.3. 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 <a href="#">KB3033929</a> and <a href="#">KB2921916</a> 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:** *The Coaxlink driver for Windows 10 is signed by Microsoft.*

**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
Linux Ubuntu 18.04.1 LTS	x86_64 (64-bit)	Kernel version 4.18.7

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

### macOS

The Coaxlink driver is designed to support all macOS versions from version 10.12 on x86\_64 (64-bit) platforms.

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

OS Name & Version	Platform	Notes
macOS 10.12.6	x86-64 (64-bit)	A.k.a. Sierra
macOS 10.13.4	x86-64 (64-bit)	A.k.a. High Sierra

**Note:** *The Coaxlink driver for macOS is signed by Euresys using a certificate that has been signed by Apple.*

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

## 2.4. 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.

## 2.5. 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.

## 2.6. 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

# 3. Important Notices

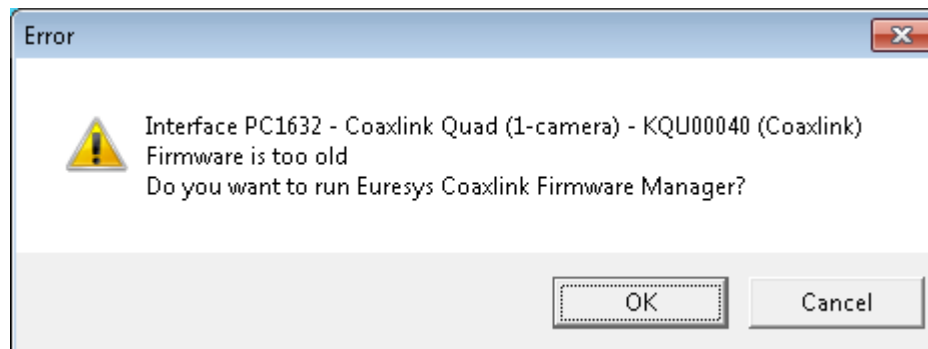
*Important notifications to be read before installing and/or using the product on your PC!*

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## 3.1. Firmware Version Requirements

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

**Note:** 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

### Coaxlink 10.2

Product/Firmware Variant Combinations	Min. Firmware Version Number
All product/firmware variant combinations	251

## 3.2. CPU Requirements

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



## 3.3. Coaxlink Driver Installation Procedure

The Coaxlink driver is distributed on the support section of the Euresys website:  
<http://www.euresys.com/support/>.

**Note:** *The Euresys website download area may require user authentication. The user ID and password are not obtained, they are chosen by the user. Access is free and unrestricted.*

1. Select the Coaxlink product series to display the file list corresponding to the latest available Coaxlink driver release.
2. Select the setup file corresponding to your operating system and your processor architecture

`coaxlink-<OS>- [<ARCH>-] <MA.MI.RE.BU>.<EXT>`

- The <OS> field designates the operating system: linux, macos, win, win10
- The <ARCH> optional field designates the processor architecture: aarch64, x86, x86\_64
- The <MA.MI.RE.BU> designates respectively the major and minor version numbers, the revision and the build numbers of the driver package
- <The EXT> field designates the file type: exe, tar.gz, pkg

**Important:** *For an installation on Windows 10, use the `coaxlink-win10- [<ARCH>-] <MA.MI.RE.BU>.exe` setup file with drivers signed by Microsoft!*

3. Launch the installer tool to install the driver files and software tools on your PC.

**Note:** *If you have an existing Coaxlink driver already installed, the installer tool prompts you to uninstall it before being able to continue. Otherwise, it prompts you for the selection of the destination folder.*

### RELATED TOPICS

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## 3.4. Driver Installation on macOS

### Memento and Coaxlink Installers

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This notice applies when installing Coaxlink or Memento Euresys drivers on macOS

After Memento and Coaxlink package files have been downloaded with **Safari**, the usual *double-click* to launch the installer will not let you install the package.

You shall use instead *control+click* and select *Open* to launch the installer. A window will pop up, click then on *Open* to proceed.

### macOS High Sierra

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This notice applies when installing Coaxlink or Memento Euresys drivers on macOS High Sierra

On macOS High Sierra, the user has to manually approve loading of third-party kernel extensions.

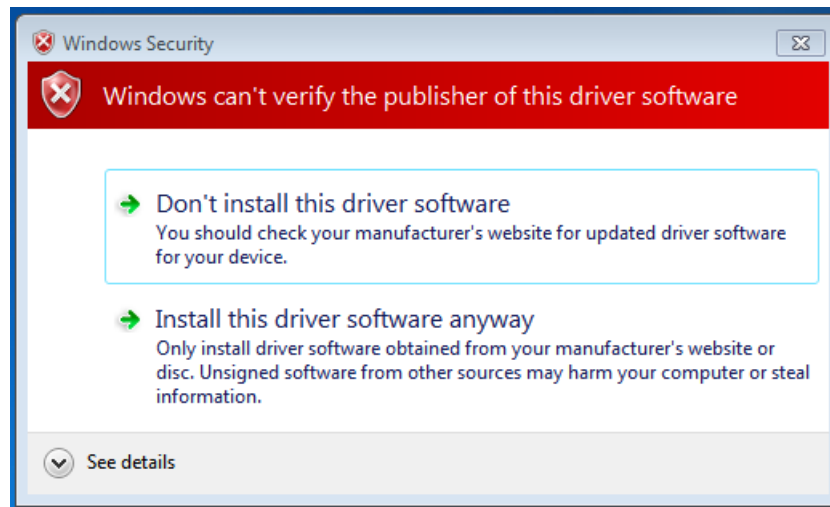
See [https://developer.apple.com/library/content/technotes/tn2459/\\_index.html](https://developer.apple.com/library/content/technotes/tn2459/_index.html)

The first time Memento and Coaxlink drivers are installed, their kernel extensions have to be approved.

A window about blocked extensions might pop up during the package installation.

Go to *Preferences* → *Security & Privacy* and ensure that **System software from developer "Euresys SA" was blocked from loading.** is not displayed. If so, click on *Allow*.

## 3.5. 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.

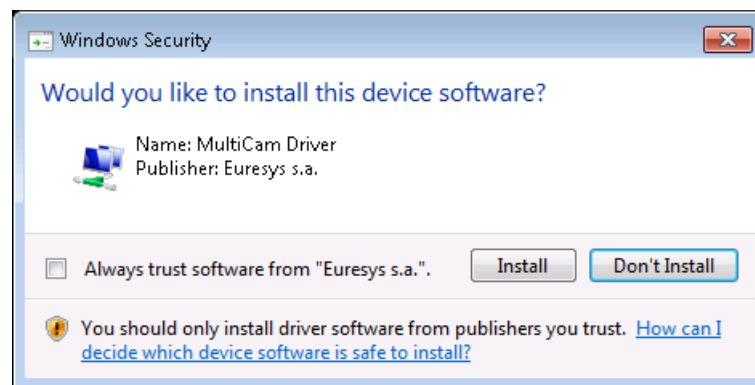
## 3.6. Driver Installation on Windows 7

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

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.

**Important:** *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

## 3.7. Driver Installation on Windows Server 2016

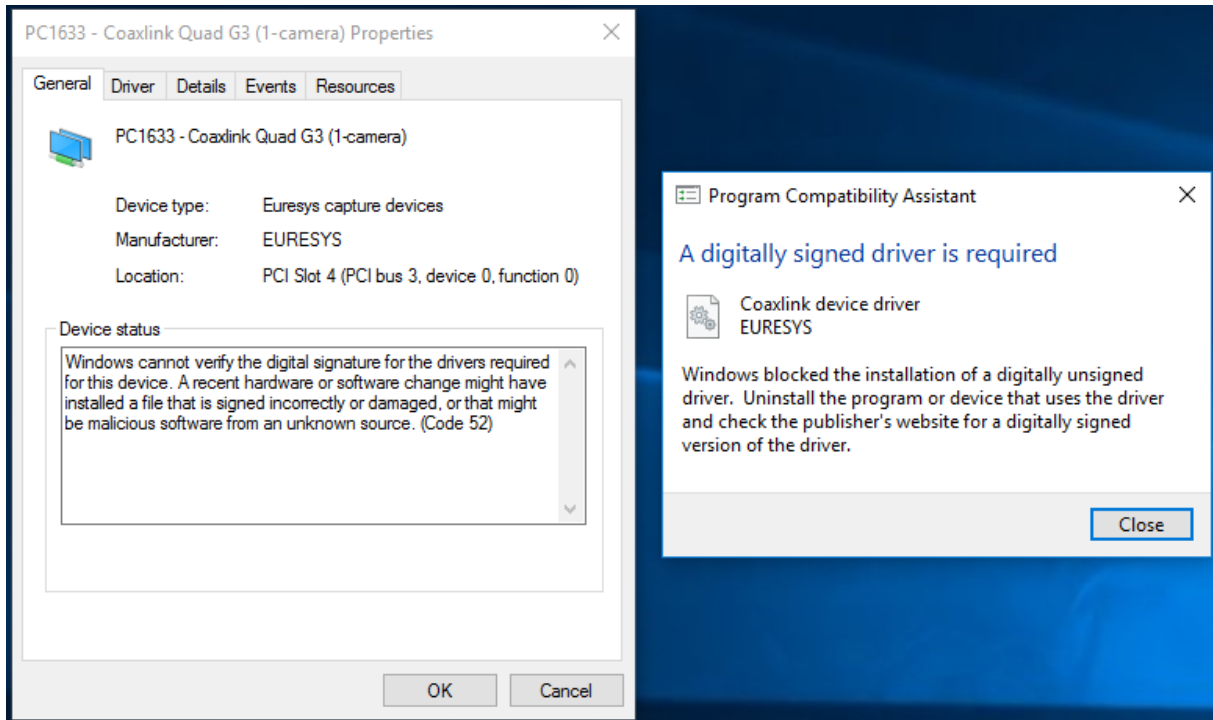
*Configuration requirements for installing Euresys drivers on Windows Server 2016*

### **Notice Applicability**

- Coaxlink driver since version 4.7

### Notice

When installing Euresys drivers on a fresh install of Windows Server 2016, 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

## 3.8. Flash EEPROM Change Note

Several Coaxlink products will undergo a hardware change of the Flash EEPROM control logic.

**Note:** *The Flash EEPROM is the memory that stores the contents of the Coaxlink's on-board FPGA.*

### Affected Products List

Product	S/N Prefix	First Serial Number of New Cards
1629 Coaxlink Duo PCIe/104-EMB	KDI	10,000
1633 Coaxlink Quad G3	KQG	10,000
1633-LH Coaxlink Quad G3 LH	KQH	10,000
1634 Coaxlink Duo PCIe/104-MIL	KDR	10,000
1635 Coaxlink Quad G3 DF	KDF	10,000
1637 Coaxlink Quad 3D-LLE	KQE	10,000

### Consequences

Existing applications using a Coaxlink driver prior to version 10.0.0 are required to use a new procedure to install or update the firmware on new boards.

The change has no impact for applications already using Coaxlink driver 10.0.0 or higher.

With the exception of the firmware update, the change has strictly no impact on the product functionality, performance and specifications:

- The hardware design of these new cards, including the CoaXPress interface, PCI Express interface, the FPGA and the I/O, has not been changed.
- The functionality, performance and specification of the new cards is guaranteed to remain unchanged. Once programmed with the corresponding firmware, the new cards remain compatible with all previous versions of the Coaxlink driver.

For further information, refer to the [D207EN-Flash EEPROM Change Note PDF document](#).

# 4. Release Details

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## 4.1. Added Firmware Variant(s)

### Coaxlink 10.2

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Target Product	Firmware Name	Description
3602 Coaxlink Octo	4-camera	One or two or three or four 1- or 2-connection area-scan cameras
	5-camera	One 1- or 2- or 4-connection area-scan camera and one or two or three or four 1-connection area-scan cameras



## 4.2. Added/Improved Features

### Coaxlink 10.2

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#### Events

##### Camera Connection and Disconnection Events

Added notifications of camera connection/disconnection events: `ConnectionDetectedCxpA`, `ConnectionDetectedCxpB`, ..., `ConnectionUndetectedCxpA`, `ConnectionUndetectedCxpB`, ..., `Device0Ready`, `Device1Ready`, ..., `Device0Lost`, `Device1Lost`, ...

#### GenICam Features

##### Interface Module

Added features `CustomLogicControlAddress` and `CustomLogicControlData` in category `CustomLogic`, available only for "custom-logic" firmware variants.

Added features `OnboardMemoryBase` and `OnboardMemorySize` in category `OnboardMemory`, available for `CustomLogic` firmware variants.

#### EGrabber

##### Improved EGrabbers Helper Class

Added function `clear` to discard current list of grabbers

Added `EGrabberPredicate` to instantiate specific grabbers instead of all available grabbers

Added possibility to reposition a grabber in the flat list

### Improved EGrabber Class

Added function `isOpen` to EGrabber class to check if a GenTL module has been open

Added EGrabber constructor parameter `remoteRequired` to indicate whether the remote device is required to create the grabber object

- **Breaking change** the grabber classes (based on EGrabber) instantiated by EGrabbers require the additional constructor parameter (`bool remoteRequired`), please refer to sample "213-egrabbers" for details!

Added functions `read` and `write` to all (not only remote device) GenTL port objects exposed in Euresys scripts

Added optional `offset` argument to `read` and `write` functions of the GenTL port objects exposed in Euresys scripts

### EGrabber Sample Programs

Updated "213-egrabbers" sample

Added "250-using-lut" sample

Added "302-cxp-connector-detection" sample

Updated "660-phantom" sample to use EGrabbers class, to simplify enumeration of available grabbers in the system

Added "501-all-grabbers-cuda-process" sample

Added "egrabber-mfc" sample

## 4.3. Solved Issues

### Coaxlink 10.2

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#### Inoperative (1-camera, 4-data-stream) firmware variant

Firmware 251 delivered with Coaxlink 10.2 fixes the inoperative (1-camera, 4-data-stream) firmware variant

#### Firmware Manager

Fixed spurious ATTENTION red label even if a card is up-to-date in coaxlink firmware manager GUI.

#### EGrabber Sample Programs

Fixed `ProjectConfigurationPlatforms` for x64 builds in **egrabber-samples-cuda** solution files.

## 4.4. Breaking Changes

*Changes in the API that are not backward compatible.*

### Since Coaxlink 10.2

#### Additional constructor parameter required

The grabber classes (based on EGrabber) instantiated by EGrabbers require the additional constructor parameter (`bool remoteRequired`), please refer to sample "**213-egrabbers**" for details

### Since Coaxlink 10

#### Deprecated functions from namespace `Euresys`

Deprecated the functions `Features`, `RegexFeatures`, `GlobFeatures`, `EnumEntries`, `RegexEnumEntries`, `GlobEnumEntries` from namespace `Euresys`, which are still available by `#defining EURESYS_USE_NS_EURESYS_DEPRECATED_API`.

Two options to fix user code:

- **Recommended change** Replace all occurrences of:
  - `Euresys::Features()` by `Euresys::query::features()`
  - `Euresys::RegexFeatures(re)` by `Euresys::query::features().regex(re)`
  - `Euresys::GlobFeatures(g)` by `Euresys::query::features().glob(g)`
  - `Euresys::EnumEntries(f)` by `Euresys::query::enumEntries(f)`
  - `Euresys::RegexEnumEntries(f, re)` by `Euresys::query::enumEntries(f).regex(re)`
  - `Euresys::GlobEnumEntries(f, g)` by `Euresys::query::enumEntries(f).glob(g)`
- 1. Or add `#define EURESYS_USE_NS_EURESYS_DEPRECATED_API` before `#include <EGrabber.h>` (or `#include <EGenTL.h>`), a quick fix that doesn't require changing source code.

### Since Coaxlink 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 9.3

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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 9.2

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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 9.1.1

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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 7.1.1

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

## Since Coaxlink 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 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 (...))`,
- Or add `#define EURESYS_USE_EGRABBER_DEPRECATED_API` before `#include <EGrabber.h>`.

## Since Coaxlink 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`,
- Or add `using namespace Euresys;` after `#include <EGrabber.h>`.

## Since Coaxlink 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 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>`)
- Or 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 4.3

#### Data Stream Module GenCam Feature

`UnpackingMode`: Changed default value to LSB (instead of MSB)

### Since Coaxlink 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`.



# 5. Known Issues

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## 5.1. Deviations from the CoaXPress specification

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### 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."*

**Note:** *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**

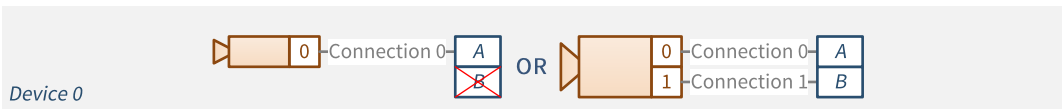
HCMAP **2D22** designates a Host Interface with 2 standard 1-data-stream CoaXPress Devices and 2 connections for each device.

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

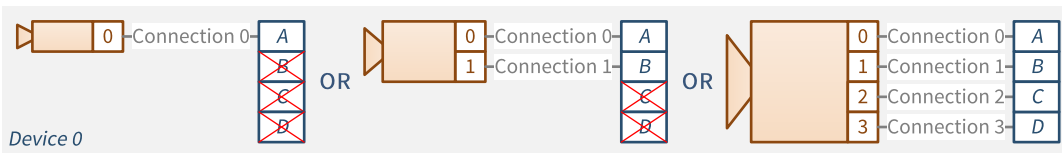
**Standard CoaXPress Devices - One-camera Host Connection Maps (1D1, 1D2, 1D4, 1D8)**



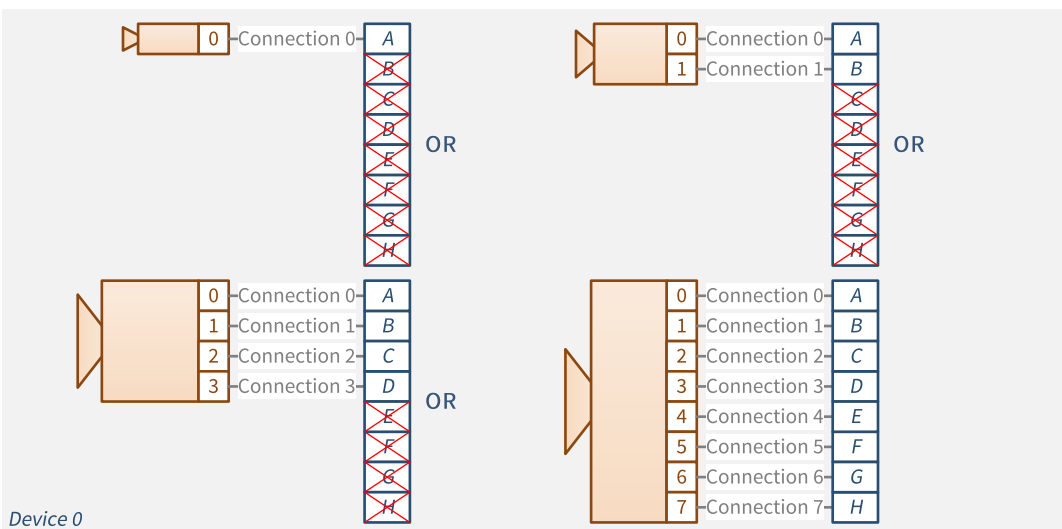
**1D1 host connection map**



**1D2 host connection map**

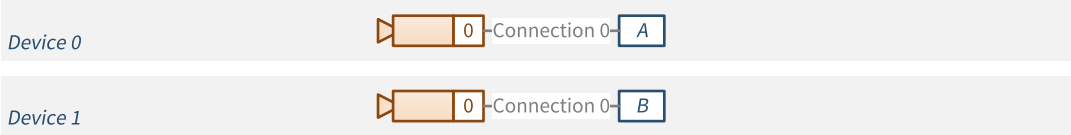


**1D4 host connection map**

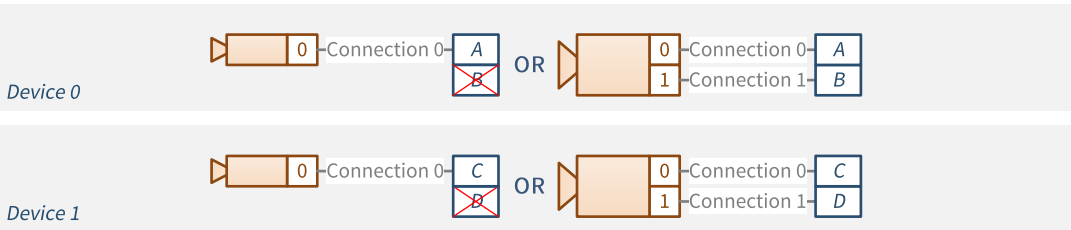


1D8 host connection map

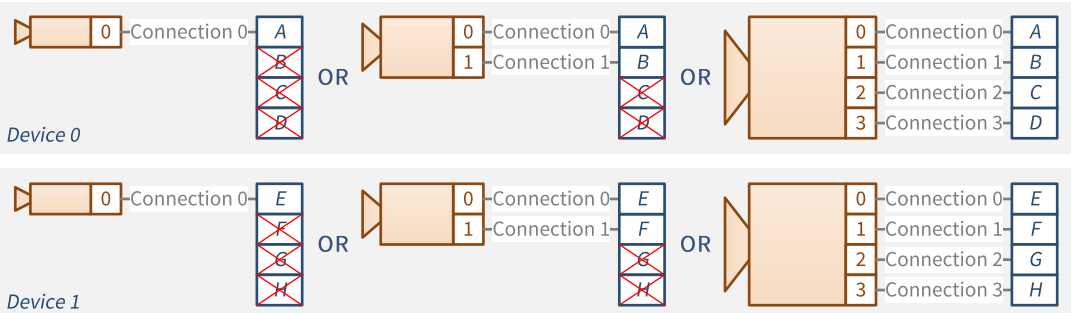
Standard CoaXPress Devices - Two-camera Host Connection Maps (2D11, 2D22, 2D44)



2D11 host connection map

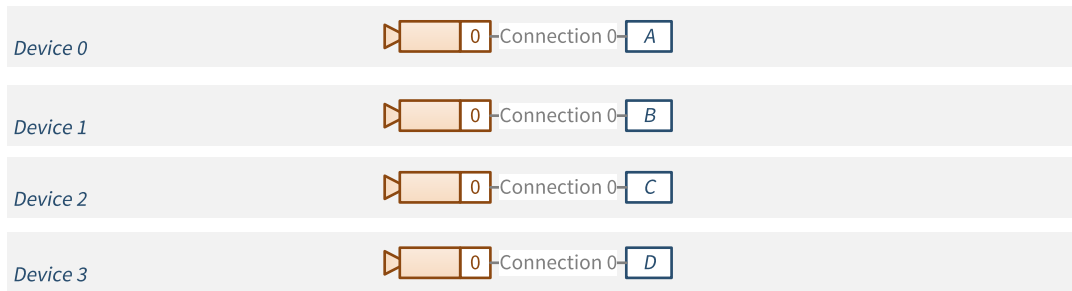


2D22 host connection map

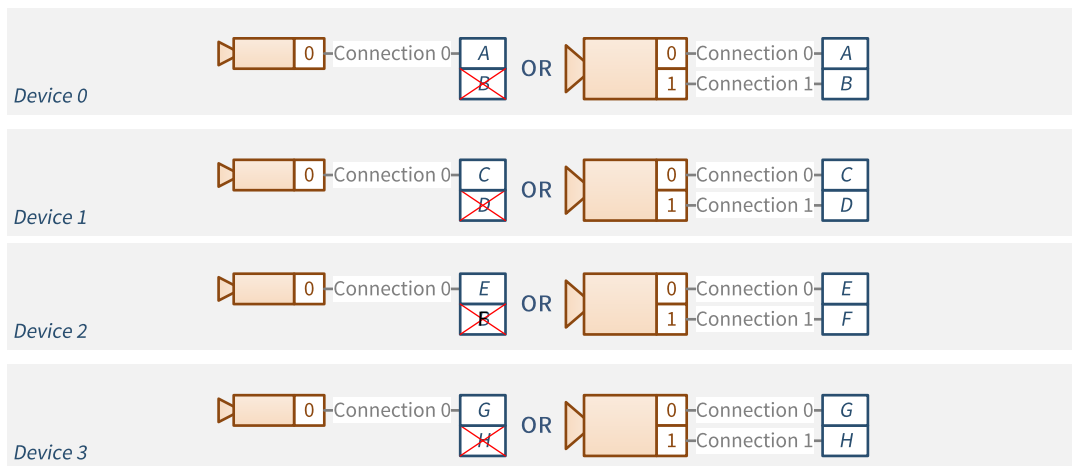


2D44 host connection map

## Standard CoaXPress Devices - Four-camera Host Connection Maps (4D1111, 4D2222)

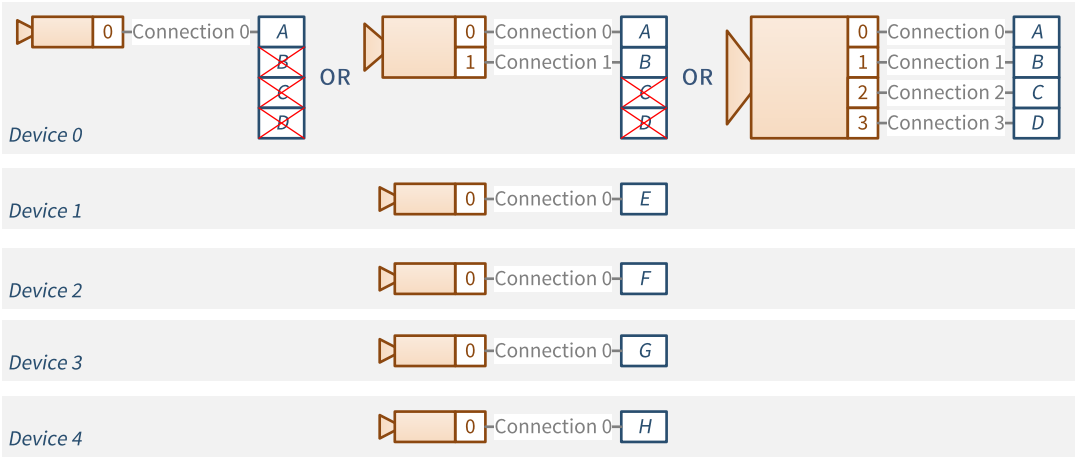


### 4D1111 host connection map

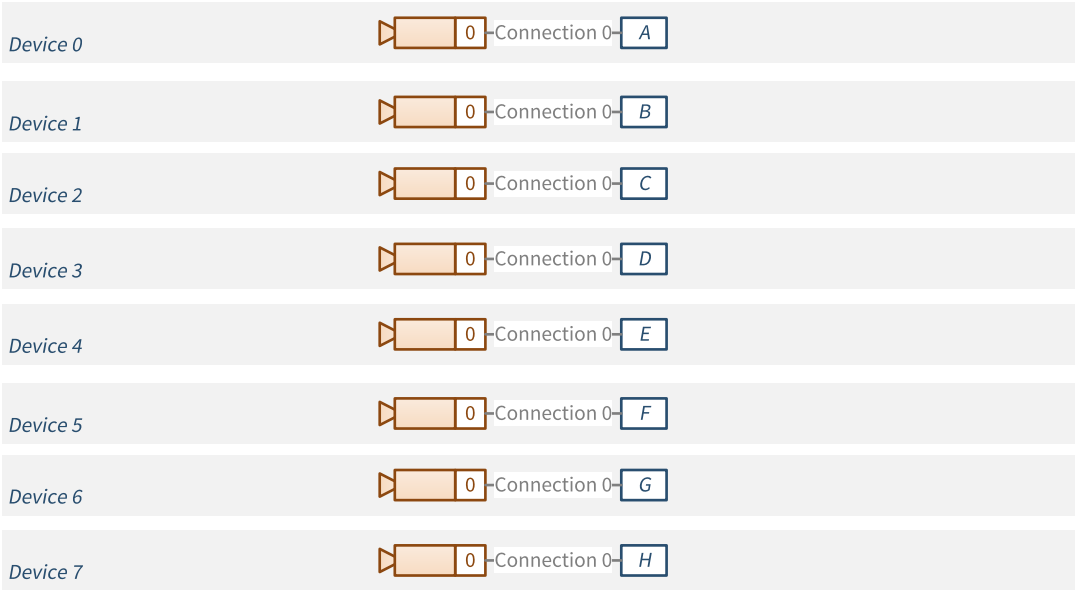


### 4D2222 host connection map

# Standard CoaXPRESS Devices - Five- and Eight-camera Host Connection Maps (5D41111, 8D1111111)



### 5D41111 host connection map



### 8D11111111 host connection map

## 5.2. 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`.

## 5.3. 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.

## 5.4. Functional Limitations

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### 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.