



Getting started with allPIXA evo: 10GigE hardware components





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1. Introduction: 10 GigE for high speed data transfer

The 10 GigE Vision Standard provides a reliable and future-proof standard protocol for high speed cameras. It allows for data rates 10 times higher than the well-known GigE Vision standard.

Advantages of 10 GigE

Standard components

10 GigE has been used in data centres for many years and is therefore a mature technology. Network adapters and drivers are available to ensure fast data transfer. Components are off the shelf available and can be changed, if necessary, without long lead times.

Long cables

Optical cables can directly be used with the SFP+ output. Depending on the optical transceiver and cable quality, fibre optical cables with 400 m and longer are possible. In addition, direct attach copper cables are available for short distances up to 30 m.

System cost

The resulting system cost by using standard components are lower than by using special and dedicated hardware components.

allPIXA evo with Dual 10 GigE

The allPIXA evo line scan camera is fully compatible with the 10 GigE vision standard and provides two SFP+ ports. For streaming image data, one SFP+ port (single channel) or both ports (two channels) can be used. The recommended hardware components, system requirements and how to set up the camera are introduced in this document.

2. User software: GCT

To access the camera and for setting parameters we recommend using the Chromasens **GCT2** software. Please download the actual version of the **GCT2** software from our homepage:

Download: <https://www.chromasens.de/allpixa-evo-downloads#software>

We refer to our user manual to get full information about the features and to learn how to use **GCT2**:

allPIXA evo manual: <https://www.chromasens.de/allpixa-evo-downloads>

and **GCT2** manual: <https://www.chromasens.de/allpixa-evo-downloads#software>

Note: The GCT2 installer provides also the installer for the Kithara real time kernel solution

For Kithara real time kernel solution no additional installer is needed, only a license dongle.

3. Hardware components

3.1 SFP+ Transceiver

Use SFP+ transceivers to connect the fibre optical cable to the camera and to the network adapter. There are different SFP+ transceivers available. There is no guarantee that each transceiver works in all network adapters. Please refer to our list of recommended hardware components in section 6.

3.2 Cables

Single mode and multimode optical fibres can be used. Please note that the type of the cable must fit to the type of the transceiver. With SR transceivers and the appropriate multimode cables up to 400 m cable length is possible. Please refer to our list of recommended hardware in section 6.

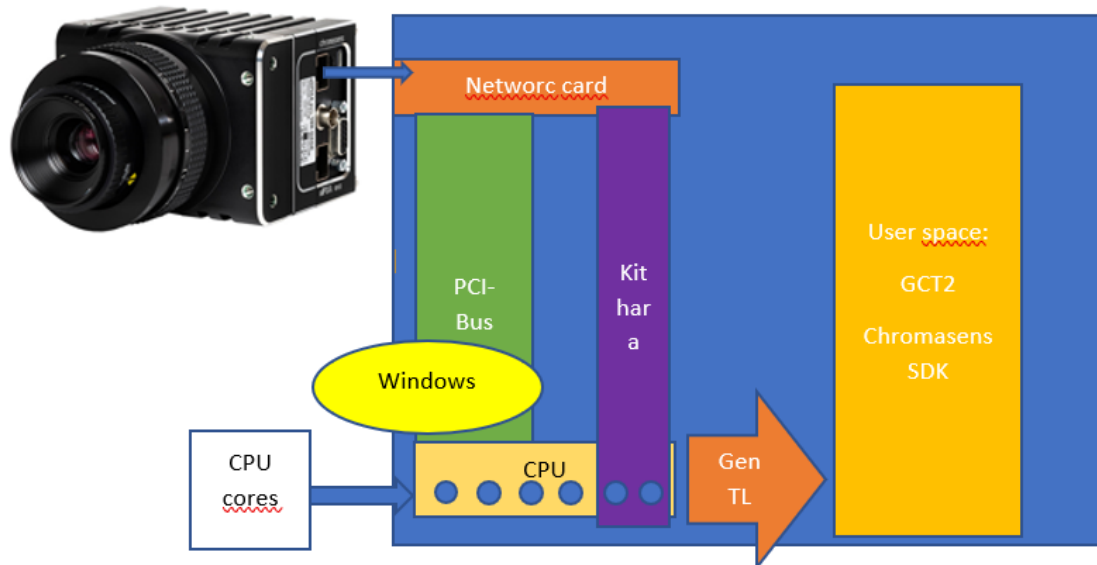
3.3 Network adapter

Network adapters with 1 or 2 SFP+ interfaces are available. To get best results with our 10GigE cameras we recommend cards which are compatible with our real time kernel solution or a network interface adapter with a large receive buffer (32k receive buffer for UDP stream). Please refer to our list of recommended hardware components in section 6.

4. Secure 10 GigE Data Transfer with Kithara real time kernel

Chromasens knows about the challenge of ensuring stable data transmission with 10GigE communication and standard network card components.

To avoid lost data packets and provide a reliable data transmission, Chromasens implemented a Kithara real time kernel solution, that controls the data transfer in the PC aside from Windows with reserved cores in a multicore CPU.



Expected performance:

Dual Link up to 16Gb/s

Single Link up to 10Gb/s

See also specifications Homepage according to your model:

[allPIXA evo 10K DXGE Color | Chromasens - Your specialist for machine vision and image capturing systems](#)

4.1 PC requirements for Kithara real time kernel solution

With ten times more data compared to 1 GigE it is important that all hardware components of the PC support high throughput.

To make sure that all data flows through and your system is compatible with our Kithara real time kernel solution the minimum system requirements are:

- ➔ Intel Core i7 or higher
- ➔ Minimum six CPU cores recommended
- ➔ 16GB RAM or higher
- ➔ 10GigE SFP+ network adapter with Intel Chipset X710 or intel 82599 chipset
- ➔ latest GCT2 version from the Chromasens Homepage
- ➔ A Kithara license dongle plugged into the computer you want to use.

The network card has to be installed in a slot that works at least with PCIe gen 3 and provides 8 lanes. The slot needs to be directly connected to the CPU. Please check the user manual of your PC to get this information.

5. Possible system setups with the allPIXA evo camera

The camera can be used in the following system setups:

- Single link (one channel connected to the network adapter in the PC)
- Dual Link (Kithara real time kernel solution required)
- Dual single link (two channels are connected to the network adapter in the PC)
- 10GigE to 1GigE (conversion to 1GigE for use with standard GigE port of PC)
for low speed where 1 Gbit/s is sufficient

5.1 Single Link Mode

To operate the camera in **single link mode** you need

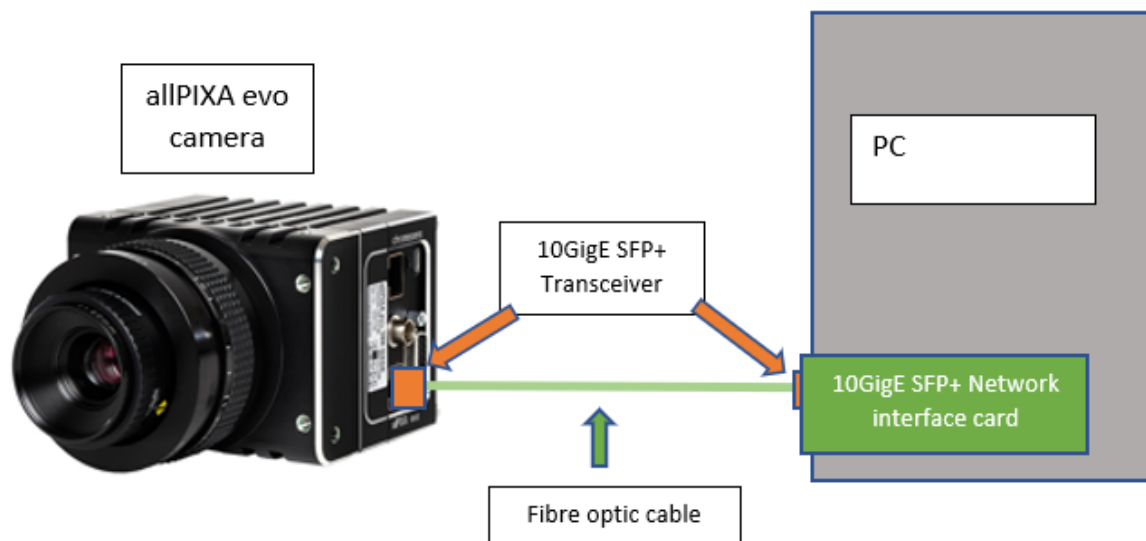
- 1 x network interface card with a single port (or more for operating two cameras)
- 2 x transceivers (types see below)
- 1 x appropriate fibre optical cable

The Single Link solution streams over one SFP+ channel

You have two options:

- Stream over one channel with the Kithara real time kernel solution (recommended), requires a network interface card with one or two ports (for two cameras e.g.) that is supported by Kithara; list below)
- Stream with one channel without the Kithara real time kernel solution over the Sphinx lib S2I Filter driver (not recommended) with a normal 10GigE SFP+ network card (packets lost can occur without the real time kernel solution)

System set up for *single link mode*



5.2 Dual Link

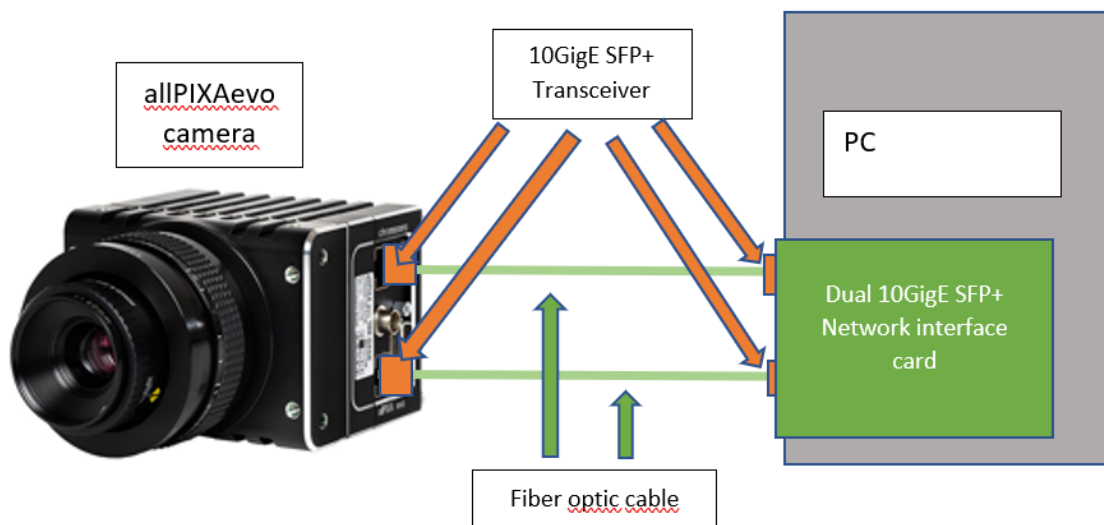
To operate the camera in **single link mode** you need

- 1 x network interface card with two ports
- 4 x transceivers (types see below)
- 2 x appropriate fibre optical cable

The Dual Link solution streams over two SFP+ channels and reaches higher speeds than Single Link.

You have two options:

- Stream with both channels with the Kithara real time kernel solution (recommended), requires a network interface card with two ports that is supported by Kithara; list below)
- Stream with both channels without the Kithara real time kernel solution over the Sphinx lib S2I Filter driver (not recommended) with an Intel network card for teaming (packets lost can occur without the real time kernel solution)



5.3 Dual Single Link Mode for transferring data to two PCs

For very special application we offer another mode to transfer data from the camera to a single or two PCs.

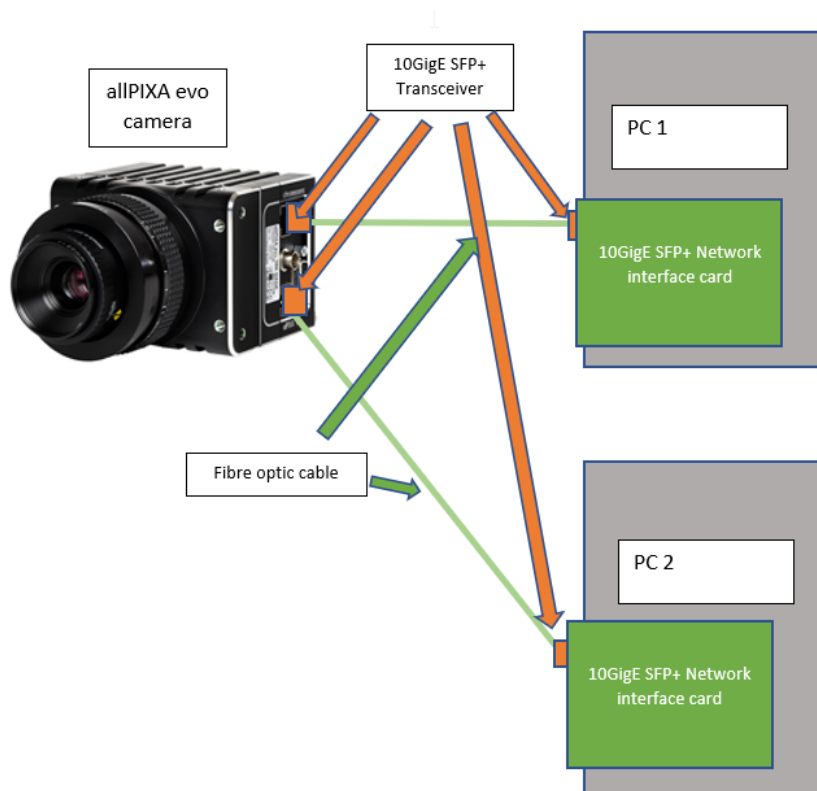
For these kinds of setups please contact our sales and technical support team.

With **dual single link mode**, the full image is split up into two ROIs where each ROI is streamed via one channel. Each ROI can be sent to different PCs which makes it possible to split up image processing to two different PCs and so handle the large number of image data.

To operate the camera in **dual single link mode** on two PCs you need

- 2 x network interface card with one SFP+ port
- 4 x transceivers (types see below)
- 2 x appropriate fibre optical cable

System set up for **dual single link mode** using two PCs



Features

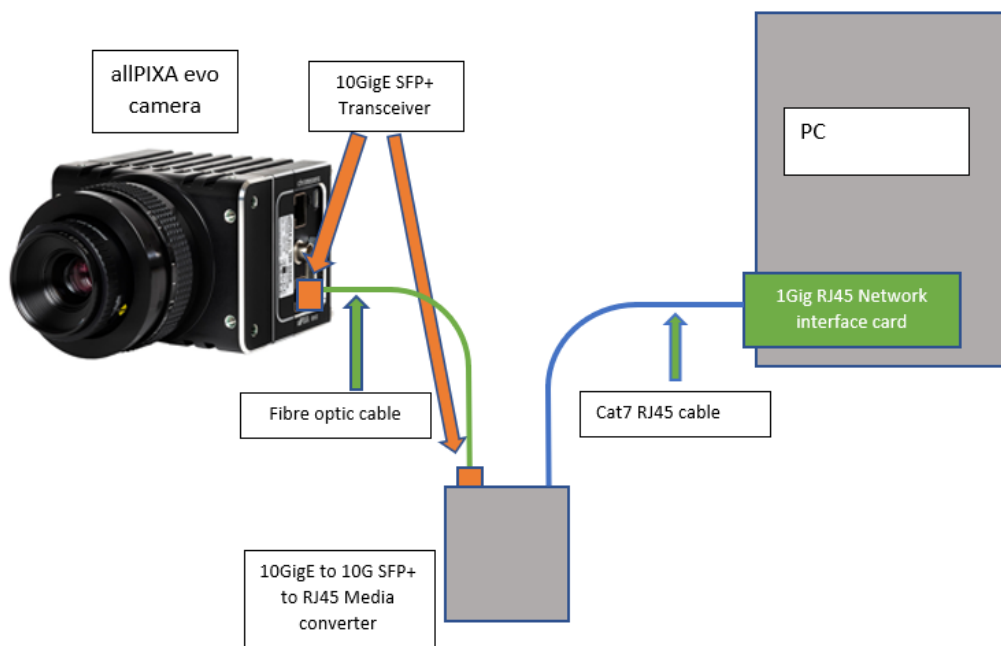
With **dual single link mode**, the data rates are higher than with single link. The resulting transfer speed depends on settings and on the ROI. Data rates of up to 6.2 Gbit/s on each channel can be possible under Windows 10.

5.4 Converting 10GigE to 1GigE

This mode is only useful for low data rates meaning slow speeds and small ROIs – e.g. 5k RGB 8 bit as well as for Mono 8bit mode.

The conversion is done by using a media converter from 10GigE to 1GigE (RJ45 connector, copper cable). Connect one SFP+ port of the allPIXA evo with the SFP+ port of the media converter. Connect the RJ45 connector of the media converter to a 1 GigE network port of the PC. Please refer to our list of recommended hardware in section 6.

System set up for 10 GigE to 1 GigE using media converter



6. Accessories and tested Components

We continuously test components and expand our list of tested hardware components. Please check our homepage or/ and with our support team for the actual list of tested components.

From our range of accessories we can configure a solution to fit your application.

We offer:

- Fiber optical cables (even for robotic applications)
- Transceivers
- Network cards
- Optics and adapters
- Customized optical solutions (only for OEM and larger orders)
- Camera adjusting solutions
- Master/ Slave trigger cables
- Power cables

6.1 Transceivers

Transceivers with SFP+ interface suitable for 10GigE

Tested transceivers on the allPIXA evo camera:

(all transceivers are of type SR using 850 nm for multimode fibres)

- Finisar FTLX8574D3BCL Class 1 21CFR1040:10
- HP 10Gb SR SFP+ 21CFR(J) CLASS1
- F24-HP-J9150A SFP+ 10G 850nm 300M 21CFR(J) Class 1
- SR FS SFP-10GSR-85 10G SFP+ 850NM 300M

Tested transceivers on the network card:

(all transceivers are of type SR using 850 nm for multimode fibres)

- Finisar FTLX8574D3BCL Class 1 21CFR1040:10
- HP 10Gb SR SFP+ 21CFR(J) CLASS1
- F24-HP-J9150A SFP+ 10G 850nm 300M 21CFR(J) Class 1
- SR FS SFP-10GSR-85 10G SFP+ 850NM 300M
- FS SFP+ Transceiver Modul mit DOM - Intel E10GSFPSRX Kompatibel 10GBASE-SR 850nm 300m LC MMF **compatible with Intel**
- Programmable Transceiver: Flexoptics P.8596.02 MMF 850nm 0,6-11,3Gbits/s programmed to „Intel E10GSFPSR“

NOTE

Some manufacturers encode their cards. Those cards can only be used with the appropriate transceivers.

Example: intel X710 chipsets only work with intel or intel configured transceivers

6.2 Fibre optical cable

We tested multimode fibre cables which fits to the above SR transceivers with 850 nm. Cables are available with different quality levels named by **OMX**. Cables with quality **OM2** can be used for up to 80 m, **OM3** for up to 300 m and **OM4** for up to 400 m cable length.

Tested fibre optic cable:

- Rosenberger fibre optic cable RO-PN: 759302 D-PK,LLC/LLC, 50µ OM3

6.3 Network interface cards

The following network cards have been tested and are compatible with our Kithara real time kernel solution.

Intel 10GigE Network Cards with X710 Chipset:

- Intel X710-DA2 10G Dual Port PCIe Server NIC 2x SFP+
- Intel-X710-BM2-based Ethernet-network card, 10G Dual-Port SFP+, PCIe 3.0 x8

10GigE Network cards/ network adapters with Intel chipset 82599ES.

- HP 560SFP+ - Netzwerkadapter - 10Gb Ethernet x 2
With Intel 82599 controller (Chromasens item No. #190502)
- 10GTEK X520-10G-2S-X8 10G NIC
Intel® 82599 chipset
- StarTech/ Dell 2-Port 10G Fiber Network Card with Open SFP+ - PCIe,
Intel® 82599 chipset
Product ID: PEX20000SFPI

For a connection without the Kithara real time kernel solution the following network adapter can be used:

That card offers a large receive buffer.

- Myricom ARC Series C-Class 10GbE Networkadapter

Available as the following models:

- Myricom 1x 10GbE SFP+ 10G-PCIE-8B-S
- Myricom 2x 10GbE SFP+ 10G-PCIE2-8C2-2S

Note: Packets lost can occur without the real time kernel solution even with large receive buffers in combination with different Hardware components.

NOTE

GCT2 provides a PowerShell script to adjust the settings of the Myricom cards automatically.

6.4 Media converters

For direct conversion **10GigE to 1 GigE** (SFP+ to RJ45)
(recommended only for slow speeds and small ROIs):

- Planet 10G/5G/2.5G/1G100M Copper to 10GBASE-X SFP+ Media converter Typ XT-705°

References

- [PMA_CHR_CD40195_R02 \(chromasens.de\)](http://chromasens.de/PMA_CHR_CD40195_R02)
- [PMA_CHR_CD40195_R03 \(chromasens.de\)](http://chromasens.de/PMA_CHR_CD40195_R03)

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