Link Aggregation Group (LAG) and Prosilica GX cameras

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What is Link Aggregation?

Link aggregation, or IEEE 802.3ad, is a networking technology that uses multiple Ethernet ports in parallel to increase the link speed beyond the limits of any one single port. Link aggregation allows the transfer of much more data than one single port can deliver.

Link aggregation technology was developed by the networking industry in the early 1990s. Initial standardization IEEE 802.3ad occurred in 2000. The technology has been widely adopted in server based applications where expandable bandwidth and redundancy are critical features of Ethernet networks.

For any application's point of view, link aggregation offers an inexpensive way to set up a high speed network while allowing the network speed to grow incrementally as demand increases without having to replace hardware or add more cabling. This capability is very appealing to machine vision systems which benefit from off the shelf components and may become more demanding over time.

More bandwidth enables higher resolutions and faster frame rates

If we consider a dual port link aggregation configuration the supported bandwidth increases from 125 MB /s (~ 1 Gb) for single port Gigabit Ethernet, to 250 MB / s (~2 Gb) for two Gigabit Ethernet links combined into a single connection.

In the case of GigE Vision cameras, link aggregation enables sensors that offer higher readout speeds due to higher resolution or higher frame rates. In addition, interpolated color formats which can double or triple the consumed bandwidth can also be supported using link aggregation.

Link Aggregation and the Prosilica GX

The Prosilica GX cameras from Allied Vision feature two screw-captivated Gigabit Ethernet ports configured as a Link Aggregation Group (LAG) to provide a sustained maximum data rate of 240 MB / s. In the case of the Prosilica GX, the host computer sees the camera as though there is only one GigE cable connected, even though there may be two. When the camera is connected by two cables to the host computer, the host computer only sees it as one connection at twice the normal speed (240 MB/s). The Prosilica GX can also work at half the speed (120 MB/s) using a single cable and operate with standard CAT-5e Ethernet cables.

Setting up Link Aggregation

Hardware Selection

The table below lists several Intel adapters which have worked well with the Prosilica GX camera.

| Manufacturer	Model	PC Bus
Intel	Intel Pro 1000 PT, dual port	PCI-E x 4
Intel	Intel ET2 Server, quad port	PCI-E x 4
Intel	Intel i340-T4 Server, quad port	PCI-E x 4

For a complete listing of networking products compatible with Allied Vision GigE cameras see the Hardware Selection for Allied Vision GigE Cameras application note:

https://www.alliedvision.com/en/support/technical-papers-knowledge-base

Host Configuration

The computer to which the camera is to be connected must have at least two Gigabit Ethernet connections enabled for link aggregation. This is a standard functionality for server type cards.

To enable the functionality in windows, access the adapter properties window. For a step-by-step instruction see: https://www.alliedvision.com/fileadmin/content/documents/products/cameras/various/installation-manual/GigE_Installation_Manual.pdf
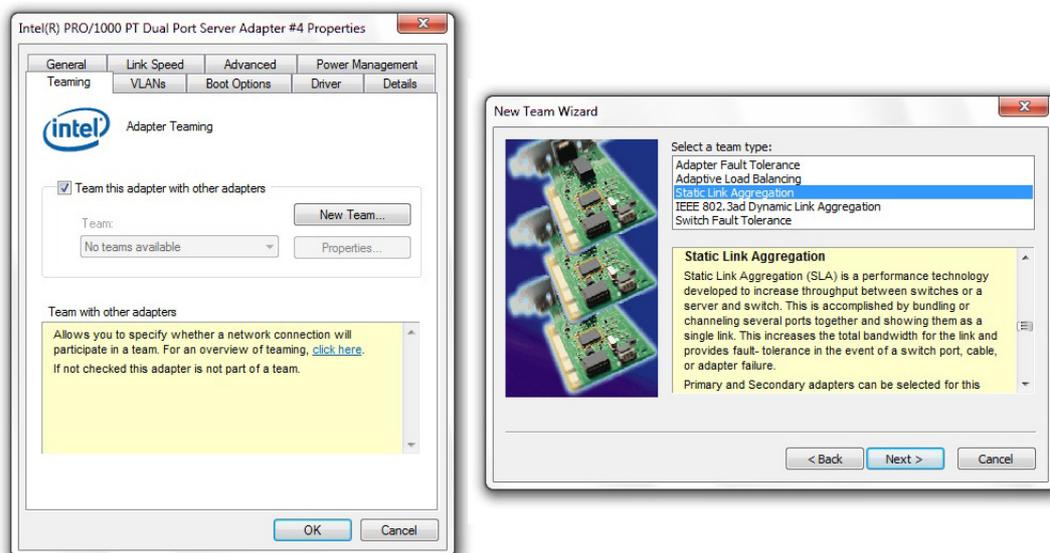
Camera Configuration

Ensure both Ethernet ports are connected. No other host software changes are necessary. The link aggregation capability is enabled automatically when both ports are connected. If only one port is connected the camera is limited to single port bandwidth.

For installing Prosilica GX, see application note GX_Installation_Instructions:

https://www.alliedvision.com/en/support/technical-papers-knowledge-base

Software Support for the Prosilica GX

Allied Vision SDKs

- Vimba SDK
- PvAPI SDK, LAG support with version 1.24.
- Universal Package LAG support with release version 1.1.

Third party imaging libraries

- Labview from National Instruments- LAG supported with NI IMAQ Dx 3.4.0.
- Common Vision Blox from Stemmer – LAG supported with driver version 10.01.000.
- Halcon from MvTex- LAG supported with driver version 9.0.2.
- StreamPix from Norpix- LAG supported with driver version 4.23.3.

The Prosilica GX is GigE Vision compliant. It can also be used with any GigE Vision driver in single port operation, including drivers not listed above.

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.

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